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THE
Ophthalmic Review

A RECORD OF OPHTHALMIC SCIENCE.

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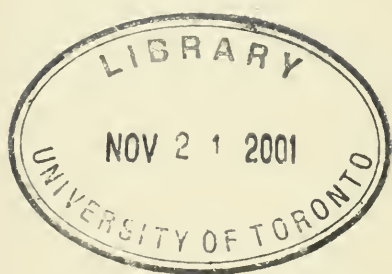
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A SILKWORM-GUT LACHRYMAL STYLE.

By J. BURDON-COOPER, M.D., F.R.C.S.E., Bath.

THE idea of using silkworm gut for a lachrymal style first occurred to me some months ago, in treating a case of localised tuberculosis of the lower end of the nasal duct. Then, I used a strand of ordinary silkworm gut, but since have modified the style, which I now make as follows. A piece of gut of moderate thickness is clamped at one end, and in the middle, by artery forceps, and these are turned in opposite directions, so as to twist the gut, which becomes fluted, or threaded similar to a screw. The extreme end of the twisted part is now flattened by hitting it a smart blow with a hammer on a smooth piece of steel, and the flattened portion pierced by a fine needle threaded with silk. A silk loop is in this way fixed at the end of the style, which is introduced as follows:—The inner canthus, and the inferior meatus of the nose are well cocainised, and into the latter a small sponge, to which a silk thread is attached, is inserted. The sponge must be placed well back over the prominence on the floor of the nose. It prevents the silkworm gut passing over the soft palate into the pharynx, which it invariably does if not prevented by some such measure, and the operation becomes infinitely more troublesome. The lower canaliculus is slit, and a silver probe passed in the ordinary way. This is followed by Galezowski's dilator, well vaselined, inserted in the same way as the probe. When the dilator has engaged the nasal duct, the jaws are separated by turning the screw, and the smooth end of the style inserted between them. The gut is grasped by dressing forceps, and by steady,

light pressure, forced into the duct. This is the most troublesome part of the operation, and needs a little patience. After a length of the gut has been pushed in, a loop should be sought for at the nostril. (Frontal mirror, speculum, and small tympanic mirror are required. I might remark that the tympanic mirror is a useful little instrument for examination of the lower end of the nasal duct, and its revelations are often very interesting, and are of extreme importance.) The lower end having been seen, it is grasped by forceps, and drawn out at the nostril. If an ordinary strand of gut has been employed, the upper and lower ends are united over the cheek. At this stage I usually let the patient have a rest, and complete the operation next day. The gut is cut on the cheek, and the upper end burnt by means of a hot needle, and a small knob of sealing wax fixed on to it. The upper end of the style is bent to a right angle, the short horizontal part lies in the slit canaliculus when the style is drawn into position. The lower end, after having a knob of wax fixed to it, is inserted within the nostril.

In introducing a silk style the modified gut style described above is used. The loop is threaded with moderately thick silk, and the style is drawn through, carrying the silk with it. By using the silk double, or in loop form, the silk style can be changed daily with little or no trouble after the silk loop has once been got through the nasal duct. As regards fixing the upper end. In one case I used the caruncle for this purpose with little or no inconvenience to the patient, but I prefer to slit the canaliculus in such a way as to leave a portion near the punctum intact, and to this ring of tissue I fix the loop. The cases *par excellence* for flexible styles are those in which there is a limited lesion near the lower end of the nasal duct, and

in the early stages of disease extending from the nose upwards. In these cases a soft style gives rise to the minimum amount of discomfort to the patient, and does as little damage to healthy parts as possible, at the same time maintaining an opening at the lower end of the duct, to which it also serves as a guide for operations in this area, and the direct application of remedies, caustics, etc. The writer has found it satisfactory for the cases he has briefly referred to, and the ease with which the style is changed and again introduced, amply repays the initial trouble.

I append a photograph, which shows (imperfectly) the corrugations in the upper half of the style, the flattened portion (the eye), and the loop passing through it. The lower part is quite smooth to facilitate introduction. It is cut short. I usually have it about 6 inches long.



REVIEWS.

E. ZIRM (Olmütz). A Successful Case of Transplantation of the Cornea. *Graefe's Archiv für Ophthalmologie*, lxiv., 3.

It has long been the dream of the ophthalmic surgeon to be able to transplant a transparent cornea to replace an opaque one, but up till now attempts have met with little or no success, the new cornea either becoming opaque at once or losing its transparency after a brief interval. In view of this the success attained by Zirm in a case which he records deserves widespread recognition. He is able to report a continuance of such transparency as was present at first, eight months after the

performance of the operation. The essential facts of the case are these:—A.G., a workman, 45 years of age, received a quantity of unslaked lime in each eye on the morning of August 30th, 1904, and presented himself at hospital on the same day. There was then a considerable quantity of lime still lying in the conjunctival sacs, and the membrane lining both upper lids was much burned superficially, and of a gray colour; that of the lower lids was swollen and reddened. The cornea of each eye was of a gray-white colour, and almost opaque, hardly permitting the pupil to be made out at all. The patient left hospital on November 17th following with both corneæ like ground glass, the irides just barely visible: able to count fingers at one mètre with the left eye and at half a mètre with the right. He was re-admitted on November 22nd, 1905, showing then a very small degree of symblepharon, not sufficient to interfere with ordinary movements, with both corneæ entirely opaque except for the extreme periphery above at the limbus: vision was reduced to knowledge of hand movements, but on both sides light perception and projection were prompt. Zirm determined to transplant cornea to replace the scar tissue, but he had to wait till December, 1905, for suitable material, which offered itself under the following circumstances:—K.B., a boy of 11, injured his right eye in July, 1905, when a fragment of iron flew from a piece which he was striking. On admission, he was found to have a small scar at the upper edge of his cornea with an anterior synechia, and a pear-shaped pupil, behind which lay a grayish-white opaque layer. He was able to count fingers at $2\frac{1}{2}$ mètres. Under chloroform two attempts were then made to extract with the magnet the foreign body which was certainly present. At the first attempt the iris bulged forward, but after an iridectomy, performed to permit the escape of the foreign particle, it could not be induced to present, either with the large or the hand magnet; then, after a copious loss of fluid vitreous, the globe collapsed, and on December 7th, 1905, the eye was excised. It was immediately immersed in warm normal saline solution. At the same time A.G. was put thoroughly under chloroform and transplantation to his right cornea carried out. The first step was the formation of a conjunctival bridge below; then, by means of v. Hippel's trephine, a disc was removed from the peripheral portion of the cornea of the enucleated eye. Then with the same trephine a disc, of course exactly of the same size, was removed from the leucomatous cornea, the transparent disc placed in the gap, and the

bridge of conjunctiva drawn across it and stitched over. This operation was not a success.

At the same sitting another disc was removed from the cornea of the enucleated eye, this time from the centre of it, immediately wrapped in gauze squeezed out of warm salt solution and kept moist and warm in a stream of aqueous vapour. With the greatest care and not a little difficulty a disc was then removed from the patient's left cornea and the corresponding piece of clear cornea inserted in its place, care being taken to touch it with no instrument from the beginning of the operation to the end. The new patch on the cornea fitted perfectly both as to size and thickness, and in order to retain it satisfactorily in place Zirm inserted two stitches in the conjunctiva, making a St. Andrew's cross of thread over the centre of the flap.

A week later the graft in each eye was clear, and with the left eye he could count fingers. To make a long story short, in a few days the graft in the right eye began to give trouble, and had to be removed, but the left did better, and on January 12th he could count fingers with it at $3\frac{1}{2}$ mètres quite readily. On February 23rd the note says that on focal illumination a very faint haze could be seen, but part of the pupil margin was actually visible. On March 11th, the patient went home, the clear graft looking black against the grey cloudy opaque cornea. On June 25th this was still true; the cornea itself was quite opaque, whitish, and intersected superficially with branching vessels. The graft, however, had none of these, and at its margin was very sharply differentiated from the cornea by a tendinous-looking ring. Just there the tissue was so perfectly clear that details of the iris could be made out quite well. Within that ring one or two very short fine lines of opacity could with difficulty be made out; except for them the graft was quite transparent. None of the vessels mentioned above as being visible in the cornea penetrated the graft. The eye could even be examined with the ophthalmoscope and the disc carefully inspected. Vision was then 5/50, and with a convex lens 3/20 and J.13. The patient was able to get about by himself quite well, and even to perform such work as feeding and attending to cattle.

Previously, one might say without exaggeration, total failure has uniformly been the result of the attempt to transplant cornea, but in this case the cornea has remained transparent so long that one may expect the clearness to be permanent, in place of lasting only for a very few weeks or days. What can

be the reason of the difference in this patient? Partly, Zirm thinks, because the graft was an exact fit for the place in which it was laid: there was neither gap between it and the old cornea nor was it in any way folded or crowded upon itself; and the graft was taken out "clean" with the trephine; there was no picking off with forceps and knife or scissors. The question is one, from first to last, of the vitality and the nourishment of the graft, which probably depends, not merely upon the loops of vessels round the periphery, but also upon the exchange with the aqueous chamber. Zirm considers that one strong point in favour of his patient was the youthfulness and healthfulness of the eye from which the graft was taken,—that of a healthy boy of 11. This, combined with the fact that the graft, cut off without touch almost, and planted immediately in a precisely fitting gap, was really a factor of much importance. It is of no use whatever, as has been so frequently done, to attempt to graft a piece of the cornea of a shrunken, atrophic globe. There were points of advantage further in the condition of the patient's own eye,—in particular, the author considers the existence of superficial conjunctival vessels ramifying over the surface of the cornea tended to help to keep alive the nutrition of the superficial parts at least of the new graft. On the other hand, where suppuration of the cornea has previously taken place, the scar tissue is so hard that it is scarcely possible for the graft to obtain sufficient nutriment for it to live and remain transparent. In some future case, Zirm suggests that the actual operation might with advantage be preceded by such preparation as this:—Some few weeks before operation he would mark out the part to be excised from the flat scar by a light touch with the trephine, then he would "raw" all the surrounding area superficially right up to the limbus; next he would undermine a zone of conjunctiva at the limbus, and by means of stitches bring the loosened membrane right across the future gap. When the consequent irritation had gone down he would proceed to the actual operation, confident that the above procedure had prepared the way, and had provided the needed increase in superficial vascularity and in tissue metabolism which is a requisite of success.

Zirm has in this case achieved a real triumph, which ought to be generally acknowledged, and which should encourage others to repeat the attempt in similar circumstances.

W. G. S.

A. LEBER (Berlin). **The Condition of the Anterior Chamber as regards Immunity.** *v. Graefe's Archiv*, lxiv., 3, 5.

TAKEN in its widest sense the object which the author has in view is to ascertain if by any means the eye can be protected against the noxious action of certain micro-organisms.

The answer to this question is satisfactory in so far as, by experiment, Leber shows that the aqueous fluid can, by certain means, be so changed in constitution that its power of inhibiting the growth of micro-organisms is increased.

The inhibitory power of the aqueous fluid must, under ordinary circumstances, depend on that of the blood serum, and thus the problem to be solved is rendered more complex. The reason of this is that the tissues through which the aqueous fluid passes in the course of its secretion may oppose, to the inhibitory bodies contained in the blood serum, greater or less resistance at varying times. Leber, however, leaves this point more or less aside and devotes his efforts principally to experiments designed to show direct results.

His work has been carried out upon rabbits, normal, actively immunised and passively immunised, with reference to the cholera vibrio and bacillus typhosus. The results, briefly stated, are that, normally, the aqueous fluid has a much lower inhibitory power than the blood serum; but that, in the case of immunised animals, the proportion of antibodies is raised, and, further, that when, especially after immunisation, a .85 per cent. solution of chloride of sodium is injected under the conjunctiva the proportion is still further raised.

It is shown by experiments equally interesting and comprehensive, that both agglutinins and bacteriolysins can be increased in amount by the above procedure, and that this result affects, not only the anterior chamber, but the lens and vitreous also.

The subconjunctival injection of isotonic salt solution seems to have a powerful effect in aiding the escape of the antibodies from the blood serum, and is an important point in the procedure.

The results which the various workers in this large field of research have, so far, been able to show, indicate that we may hope to be able, in the future, to do more in the way of protecting patients from the untoward results of accident, and, sometimes, of operations.

In the domain of general surgery the work of Sir A. E. Wright

and his followers, on opsonic indices and vaccine injections, has led to excellent results, but in ophthalmic surgery to wait even a day often means loss of an eye, and it is consequently important to know of any means by which the protective power of the fluids of the eye may rapidly be increased. Of course, in the case of accidents, not only microgenic infection, but also thermic, chemical and mechanical influences have to be taken into account, so that one must not be too sanguine as to the results of experiments.

The author gives an excellent *résumé* of the literature of the subject, and appends a copious bibliography.

LESLIE BUCHANAN.

E. PFLÜGER (Bern). The Conditions and Rate of Secretion of the Aqueous.

TÜRK (Berlin). Currents in the Anterior Chamber.

v. Graefe's Archiv f. Ophth., lxiv., 3.

THE great lymph lake of the anterior chamber is a peculiar feature in the geography of the eye, and must play an important part in the commerce of its tissues. Here are two papers which attempt some answer to the questions, At what rate do its waters flow? and What currents may we find in its apparently motionless depths?

Dr. E. Pflüger (son of the late Prof. Pflüger) undertook an enquiry, under the guidance of Prof. Starling, into the production of the aqueous humour under normal conditions and under conditions of altered blood-pressure. The investigation was left unfinished, owing to his unexpected departure from London; but that portion which referred to the quantitative secretion of the aqueous appeared sufficiently complete in itself to form the subject of a paper.

The method of investigation adopted was as follows:—A movable reservoir containing physiological salt solution was connected, on the one hand, with a mercurial manometer, and, on the other, with a graduated capillary glass tube, which in its turn communicated with a cannula inserted in the interior chamber. A bubble in the capillary tube served as an indicator. Having found the manometric pressure at which the bubble moved neither towards nor away from the eye, or, in other words, the intra-ocular pressure, the blood-supply to the eye was suddenly cut off by drawing tight the ligatures

previously placed under the carotids. With the sudden anæmia of the intra-ocular vessels thus produced the secretion of aqueous was completely abolished; a stream set in from the reservoir towards the eye, and the author's inference is that the rate of this stream is the rate at which the aqueous was being secreted before the blood supply was cut off.

In some experiments the subclavians were ligatured before the carotids. "By this proceeding a hyperæmia of the eye was caused, an increase of the intra-capillary and extra-capillary pressure, and thus of the intra-ocular pressure." How this increase of pressure can be supposed to continue after the carotids have also been ligatured is not very clear. As a matter of fact the intra-ocular pressures registered by the manometer were always extremely low, not reaching 45 m.m. of mercury at the highest. It was found that a second trial on the same eye (the carotids having been released meanwhile) always gave a higher figure for the rate of flow into the eye than the first experiment; and the second eye of the same animal a higher rate than the first. This increase the author attributes to increased permeability of the capillary walls and filtration endothelium from molecular changes due to deprivation of blood. He rejects therefore all but the first experiment on the first eye of each animal; and, collating the results of these, he obtains a figure of 6 to 8 cubic millimetres per minute in dogs of small to medium size, as representing approximately the flow through the anterior chamber under the conditions named.

In one case the blood-pressure in the femoral artery was measured at the same time, and an attempt was made to ascertain the relationship between the general blood-pressure, the intra-ocular tension and the intra-ocular filtration rate. The results, however, were impossible to bring into line, and the author concludes that, "though blood-pressure, intra-ocular pressure and secretion of aqueous stand in undoubted relationship, that relationship is not capable of exact mathematical expression, is relative rather than absolute, and, owing to intervening factors not yet worked out, is variable within somewhat wide limits."

It is indeed somewhat difficult to resist the impression that the words just quoted might be applied to the whole of this investigation instead of only to a part. When we consider, for example, that even rubbing the surface of the cornea, without the production of any visible lesion, is sufficient to

materially alter the character of the fluid poured into the anterior chamber, what conclusion is it possible to draw as to the secretion of aqueous from an eye whose cornea is pierced and whose blood-vessels are more or less completely emptied of blood? in an animal, moreover, which has been under an anæsthetic for an hour before the observation is made, curarised, injected with leech extract to prevent coagulation of the fluids in the eye, and kept alive by artificial respiration? Surely the conditions of the experiments involve too many factors of uncertain moment to warrant any exact numerical results being deduced therefrom.

A curious appearance in the anterior chamber was first noticed by Ehrlich about five-and-twenty years ago, and has not hitherto been satisfactorily explained. When a sufficient quantity of fluorescein is introduced into the circulation of an animal it presently makes its appearance in the anterior chamber, not, as might be expected, as a diffuse colouration of the fluid, but as a vertical green line in the centre of the anterior chamber just behind the cornea. If we watch it we see various changes in its form and position. It becomes brighter or dimmer, or even for a moment disappears; now it is narrow, now wider; now sharply margined, again perhaps passing at its edge into a faint green veil which covers half the anterior chamber. It may reach the angle of the chamber above and below, or it may divide at a varying height into two diverging limbs, or it may even be double in its whole extent. Occasionally it veers from the mid line of the chamber a little to one side, soon to return to its original position. The definiteness of the appearance gradually diminishes, and finally disappears by the whole aqueous becoming uniformly tinged with green.

Various attempts have been made to account for the phenomenon. Ehrlich's own supposition was that the line represented the meeting point of two horizontally-directed streams issuing from two secretion centres placed nasally and temporally in the iris. Nicati thought it must be due to two circular currents, one in each lateral half of the chamber; but the only cause that he could conceive for these circular currents was a communication (by "vibrations") of the current of blood in the major circle of the iris to the fluid in the chamber.

Both theories are negatived by the fact that the line remains

vertical, although the eye be rotated nasally or temporally. It must clearly be an effect of gravity; and the most obvious explanation would be that it was a stream of specifically heavier fluorescein solution falling from the top to the bottom of the chamber. But further consideration shows various objections to this view; for example, there is no hypopion-like collection of the coloured fluid at the bottom of the chamber, such as one would expect if it were merely a result of density; and, further, the line does not take the shortest route from point to point, which would be along the face of the iris, but follows the curved posterior surface of the cornea.

Türk, in this paper, points out a simple and satisfactory explanation of the phenomenon, in the fact that the anterior and posterior walls of the chamber are of different temperatures. It has been found, for example, in the guinea-pig, that the temperature of the corneal lamellæ is 4° below that of the aqueous, and nearly 10° below that of the iris. In this difference of temperature we have the source of differences of specific gravity in the fluid, and hence of currents in the chamber.

In order to test the correctness of this supposition, Türk made a model of the anterior chamber by means of a watch glass closed behind by a flat sheet of glass. This being filled with water and placed vertically, a vessel containing warm water was placed in contact with the glass plate, so as to represent the warm iris, while a drop of weak solution of fluorescein was introduced under the edge of the watch glass. The following appearances then presented themselves:—The green solution extended itself upwards along the angle of the chamber until it reached nearly or quite to the top of the chamber, thence it flowed in a vertical line down the middle of the back of the watch glass to the bottom of the chamber; then it turned upwards again in the same direction as at first, but not quite so peripherally, and again reaching the summit of the chamber turned vertically downwards a little externally to the original vertical line. Thus a sort of spiral of two or three turns might be formed. In about ten minutes the colouration had become diffused, so that one-half of the chamber appeared uniformly green. The introduction of two drops simultaneously, one at each side, produced a double green line down the centre, and, ultimately, a right and left diffusely green half separated by a dark, *i.e.*, uncoloured, vertical line.

The longer the interval between the beginning of the

warming and the insertion of the drops the wider was this uncoloured line, within certain limits. Very striking was the effect when the drops were introduced *before* the warming began; as soon as the warmth made itself felt the sluggish green clouds began to show signs of life, and within a minute had arranged themselves in the symmetrically-ordered pattern above described. The reason of the rising stream showing itself at the periphery is that here the layer of liquid is thinnest, and hence most rapidly warmed, while that next the centre of the cornea is further from the source of heat and remains relatively coolest and heaviest.

The demonstration was completed by experiments on animals. When, in an animal which had been injected with fluorescin, one eye was kept bathed with water of the body temperature only a diffuse greenish colouration appeared in the anterior chamber of that eye, while the other showed a typical Ehrlich's line. The warm irrigation was stopped, and in about a minute the line appeared in that eye also.

Naturally the existence of the currents indicated by Ehrlich's line has not been actually demonstrated in the human eye. But Türk thinks that certain pathological appearances point to their existence. The well-known triangular patch in which the dots of keratitis punctata are arranged is a case in point; this triangle represents the area in which the current is least, and where, consequently, the tiny cell clumps have most chance of becoming adherent to the cornea. Further, in cases of slight corneal lesions where no gross deposits from the aqueous are present, Türk has seen not infrequently on the posterior surface of the cornea a delicate grey line of fine dust-like deposit extending from the lowermost point of the anterior chamber for some millimetres vertically upwards, thus, in position and form, resembling Ehrlich's line.

One more point of interest in connection with the phenomenon under discussion remains to be noticed. The definiteness and constancy of its appearance under suitable temperature conditions is fairly good evidence that no *other* sources of current exist in the anterior chamber; and we may infer from this that the rate of secretion of the aqueous is under normal conditions a slow one, too slow, that is, to produce a stream capable of affecting the temperature currents.

H. VILLARD. **Ocular Disturbances Consecutive to Direct Observation of Solar Eclipses.** *Annales d'Oculistique*, August, 1906.

A PERSON who has imprudently gazed for any length of time at the bright solar disc complains afterwards of a fixed or moving central scotoma. There is only occasionally any change in the external appearance of the eye, and then only a slight hyperæmia of the conjunctiva is discernible. Even though the positive scotoma is present the vision may be normal, but more commonly it is reduced, though it is rarely less than $\frac{1}{3}$ of the normal. Pupillary reflexes are normal, but sometimes if one eye only has been exposed the pupil on that side is smaller than the other. The scotoma is almost always central, but exceptionally it is paracentral. It is always positive, with one exception, and it appears as a dark grey cloud. In some cases it presents yellowish or greenish reflections which persist even on the closure of the eyes. The scotoma may be oval, but usually is circular and sharply outlined; as a rule it is not large, subtending an angle of some 4° to 8° only. Occasionally the scotoma is not absolute. Now and again it is not fixed, but presents rapid and irregular movements, or it seems to rotate. The peripheral fields are practically not affected, either for white or colours.

One case of hemianopsia is recorded, coming on in attacks lasting about ten minutes, followed by headache, and recurring for years. In the opinion of the reviewer there is probably no direct connection between this symptom and the sunlight. *Muscæ volitantes* are complained of. *Macropsia*, the usual variety of metamorphopsia met with, was present in about one-fourth of the cases. The central colour perception is slightly lowered. Most cases present no appreciable alteration in the fundus, but in a fair proportion slight changes have been noted, although it is by no means certain that they all were due to the effect of the sun. The most frequent and characteristic lesion is a reddish tint at the macula with a small hæmorrhagic point in the centre.

Numerous other grosser changes have been probably wrongly attributed to the sun effect; for example, optic neuritis, hyalitis.

The prognosis is usually good, but as the scotoma may persist for some weeks or months or even remain permanently it should be a guarded one at first.

For treatment, dark room and local and general depletives are advised. Later strychnine or the iodides in small doses are indicated.

J. GRAY CLEGG.

VILLEMONTÉ (Bordeaux). **Stretching the External Nasal Nerve.** *Recueil d'Ophthalmologie*, September, 1906, p. 513.

To an English reader the title of this paper is quite misleading, for a careful examination of its contents shows quite clearly that the author means the stretching of some cutaneous branches of the loop formed by the supra-trochlear branch of the frontal division of the ophthalmic nerve and the infra-trochlear branch of the nasal division of the same nerve. In all English text-books of anatomy the "external nasal nerve" is situated in quite another region than the site of this operation, being distributed to the skin covering the tip and lower part of the wing of the nose.

The operation of which Villemonté writes was first performed by Badal in 1882 for the relief of ciliary pain, and has since been repeated by several French surgeons.

The author comes to three conclusions after watching 81 cases, viz.:—

1. That in neuralgia of the ophthalmic nerve of Willis the operation gives as good results as that of stretching the frontal nerve.

2. That when performed for acute glaucoma the tension falls, the pain is stopped, and a definite cure results. In chronic glaucoma the effects are uncertain and "mediocre."

3. In acute ciliary pain from iridocyclitis the operation is excellent, and obviates many enucleations. In chronic cases the results are less good, but sufficiently encouraging to warrant further use.

The operation he describes thus:—After the usual aseptic precautions the index finger is pressed against the root of the nose and upper border of the orbit just above the canthus, a curved incision is made parallel to the upper angle of the finger nail so placed, and penetrating to the subcutaneous tissue; now a strabismus hook is pushed down to the bone, and all the tissues gathered into it; then if the tissue is resisting a second hook is called into use and the tissue torn; then, in the author's words, one or two small white filaments of nerve

appear stretched across the rupture and can be dragged out for two or three centimetres. He describes the operation as being exceedingly easy and not subject to any risks. Subsequent to the operation there may be a peculiar sensation of numbness about the root of the nose, orbital margin and forehead; and the prick of a pin is not felt in the region.

From the opening paragraph of this review it will be seen that the first conclusion of the author is by no means sure. With an incision so made the nerve branches stretched are those which come from a loop of conjoined frontal and nasal nerves, and the fibres that are most likely to be included within the strabismus hook are those derived from the supra-trochlear limb of the loop, that is, frontal fibres and not nasal at all.

In the matter of clinical results, it is disappointing to learn that good effects have apparently only been obtained in acute cases, cases in which, particularly as regards glaucoma, we have much surer and well-tried measures of procedure; whilst in those chronic and painful cases, where some other methods than are at present available would be warmly welcomed, he finds no satisfactory effects.

If these cases could be classed as neuralgic and susceptible of relief by stretching the nasal nerve, it would seem to be a much more sound proceeding to stretch the loop of the supra- and infra-trochlear nerves below the pulley of the superior oblique muscle, where they are easily reached, or else by the bolder and more direct method of stretching the nasal nerve itself as it escapes from the orbital cavity through the anterior ethmoidal foramen.

N. BISHOP HARMAN.

J. HERBERT PARSONS. **The Pathology of the Eye.** Vol. iii.: "General Pathology," Part I. London: Hodder and Stoughton.

THE third volume of this important work deals with the General Pathology of the Eye, the subjects of which it treats being Congenital Abnormalities, Ametropia, the Circulation and Nutrition of the Eye, the Normal Intra-Ocular Pressure, and Glaucoma. Dealing as it does with broader questions of general pathology, this volume will be found in some respects even more inviting than its predecessors.

In discussing the vexed question of the etiology of congenital

abnormalities, Mr. Parsons expresses the opinion that we should only suppose an inflammatory lesion has existed when the appearances found cannot be explained as arising merely from arrest of development. As an example of a condition which cannot well be reasonably explained on any other assumption than that of intra-uterine inflammation Mr. Parsons cites congenital anterior staphyloma. This condition must arise from perforation of the cornea, and Mr. Parsons thinks the probable path of infection is the liquor amnii.

A case of anterior staphyloma observed by himself in a child of 3 days is described in detail. Mr. Parsons is inclined also to explain congenital anterior synechiæ on the inflammatory theory.

Colobomata are discussed in most interesting fashion. Mr. Parsons describes a macular coloboma in which there was no actual gap in any layer, the most defective layer being the pigment epithelium. A recognisable, though imperfectly formed fovea was present. There was no evidence of an inflammatory origin. The pathogenesis of colobomata is a question bristling with difficulties, and Mr. Parsons does not seem to think that any one theory adequately explains the various cases that come under clinical observation. The experiments of von Hippel, who by breeding rabbits from a male with typical coloboma of the choroid and partial colobomata of the iris and lids, was able to obtain a large number of fœtal eyes with colobomata, are of much interest in this connection.

Two chapters are devoted to the pathology of ametropia. Myopia naturally receives the largest share of attention. The vexed question of the relation of a conus to a fully-developed posterior staphyloma is discussed, but very guarded opinions are given. Heine's view that the macular changes in high myopia are mainly of retinal origin appears to be accepted. The choroidal changes in high myopia are described as consisting essentially in over-stretching and atrophy, there being little evidence of inflammatory change. Interesting statistics are quoted regarding the bearing of such factors as age, sex, occupation, nationality, etc., on the occurrence of myopia. Most readers will agree with Mr. Parsons when he states that the evidence in the matter of the extrinsic theories of myopia is discordant and unsatisfactory, and that there is much more to be said in favour of the view that myopia in its higher forms is essentially due to a congenital weakness in the

posterior segment of the eyeball. At the same time, Mr. Parsons does not seem to think that the existence of a chronic inflammatory process at the posterior pole has been definitely disproved. No definite opinion is expressed regarding the relationship of the various clinical varieties of myopia.

No less than 130 pages are devoted to the study of the circulation and nutrition of the eye, and the normal intra-ocular pressure. Mr. Parsons in his preface freely acknowledges his indebtedness to Leber, whose contribution to the "Graefe-Saemisch Handbuch" (Die Circulations und Ernährungsverhältnisse des Auges) gives such an exhaustive resumé of what is known in this wide field of enquiry. Mr. Parsons has been very successful in bringing the more important facts into due prominence, and gives an excellent and up-to-date review of the work done and the conclusions reached.

The short chapter on immunity will be welcomed by many. Römer's work is of course all-important from the ophthalmological standpoint, and receives due recognition.

The chapter on glaucoma is interesting, as it could not fail to be. At the same time one seeks in vain for fresh light on the etiology of primary glaucoma. Prominence is given to Priestley Smith's theory of the large lens as an important predisposing cause. Personally, we have not a grain of faith in this theory. In seeking an explanation of primary glaucoma we venture to think that Mr. Parsons does not differentiate sufficiently between an acute glaucomatous attack and conditions of prolonged increased tension without acute symptoms.

We congratulate Mr. Parsons on a volume in every way worthy to take rank with what he has previously written.

FORTIN. *An Essay on the Physiology of the Fovea Centralis.*
Archives d'Ophthalmologie, October, 1906.

INTO this essay, which comprises six pages of the periodical, the author compresses much that is of intense interest to an oculist, and to which an essay, probably of four times the extent, would only do justice.

After alluding to fixation and the maximum sensibility possessed by the fovea for the sense of form, Fortin gives some figures regarding its dimensions, and then compares the total

foveal area, which, he says, is enormous, with the extremely minute central portion, which alone serves for fixation. On the importance and precision of fixation it is unnecessary to dwell, but the minuteness of the area ($2-3\mu$ at the most) on which such fixation depends, is perhaps less fully realised, and its importance cannot be over-estimated.

The relationship existing between the fovea and the visual acuity has been well studied; but the majority of workers in this field have mainly concerned themselves with the general relationship existing between the central and peripheral visual acuity. That existing between the foveal and para-foveal acuity has received scanty attention in comparison. Of those who have studied the latter, Aubert and Foerster found that beyond $2^{\circ} 52'$ from the centre of the retina, the visual acuity fell to less than $\frac{1}{5}$, while even at $30'$ the visual acuity was not more than $\frac{3}{4}$ (Burchardt).

Recently Broca and Sultzter, introducing into the study of the retinal functions that of time, have found that within a circle of 52μ radius from the centre of the retina the duration of a flash of light, before being perceived by the fixation point, was only about $\frac{1}{4}$ of that required to produce a sensation 25μ distant.

It is stated also that images cast upon the marginal portion disappear before those on the central part of the fovea, indicating that the fovea not only possesses maximum sensibility, but is less liable to fatigue.

Whatever be the import of this it is always well to consider the other side of the question, and in this connection it might be pointed out that the acuity of the para-fovea exceeds that of the fovea, at least as regards light perception. That this is so is easily proved. In the dark an object slightly darker than the background and indistinguishable from it when it is fixed, is easily distinguished when the gaze is directed to one or other side. The same applies in distinguishing faintly visible stars, or in following a feebly-marked mountain path. This is also true within wide limits of total illumination, and for monochromatic as well as for white light. A small blue flower in a green field is, in broad daylight, under suitable conditions, indistinguishable as to its colour when the eye fixes it, but when the fixation point is slightly altered the difference is at once patent and the colour recognised.

The fovea and para-fovea in connection with the light sense receive scanty attention. Here in the essay Fortin, still

having before him the accuracy and precision of the fovea, attributes to the latter the inaccurate results of refraction furnished by skiascopy. The skiascopic shadow is determined by a large portion of the fundus, and the visual acuity is almost solely dependent on the fovea. Between the two considerable difference exists, and Fortin thinks, for this reason, that it is useless to attempt the estimation of anything less than one dioptré by retinoscopy. Small errors must be worked out subjectively at the trial case.

After referring to central scotoma and its detrimental effect upon the visual acuity, under the head of Pathology of the Fovea, Fortin takes up binocular vision. He describes three classes—the first typified in the rabbit, with its eyes placed on either side of the head (panoramic vision of Ramon y Cajal), in which there is a complete decussation of the nerve fibres in the chiasma; the second comprising those pathological cases in which an eye has lost the power of fixation, though still preserving intact the field of vision; included in this group are animals such as the dog, which have a visual field common to both eyes, though the eyes do not fix simultaneously the same point; and, lastly, the normal vision of man, where the two eyes fix an object simultaneously. Fortin makes use of the term *iso-fixation* to describe the latter, and for this to be realised certain conditions need to be fulfilled. The cerebral fusion centres must be intact, and the images falling on the two fixation points are to be identical and super-posable. He does not believe it is possible to fuse two images which are not identical, however small they may be when they fall on the two fixation points. He has experimented with specially constructed stereoscopic figures, the images of which for the two eyes were accurately super-posable. The central points were alone dissimilar. However well he succeeded in fusing the two figures he was never able to fuse the two small central dissimilar points. They were either repelled or attracted. On the contrary, outside the points of fixation it was found possible to fuse images possessing very dissimilar contours.

Upon such subjects as physiological diplopia, horoptery and stereoscopy volumes have been written. The author draws a sharp contrast between the retinal image of the mathematician and that of the physiologist as regards continuity and homogeneity. The constituent elements of the physiological image differ individually, as well as in the regions which they occupy and the functions they have to fulfil.

In conclusion, the author discusses paralytic diplopia, and in this connection alludes to the device of Terrien, which consists in obscuring, by a paper or ground glass disc, only that part of the visual field of the paralysed eye in which fixation is possible. The utility of such a device may be gauged by holding a strong prism, apex up, in front of one eye and covering the anterior face of the prism with a paper disc, so that the line of fixation would traverse the prism at the opaque spot. With both eyes open it will be noticed that diplopia is much less troublesome. The author speaks well of it.

J. BURDON-COOPER.

FRÜCHTE and SCHÜRENBERG. **Cysts in the Cornea.** *Klinische Monatsblätter für Augenheilkunde*, October, 1906.

THE authors describe in detail a case in which there was a cyst of the anterior chamber and one in the corneal parenchyma. The cysts were of the usual implantation character, lined by epithelium obviously derived from the corneal surface, and were separated by Descemet's membrane; although no direct connection between them was found there was evidence that such had formerly occurred.

The authors shortly review the classification of corneal cysts into pre-corneal and intra-corneal, the former being associated with true and false pterygium, the latter being either implantation and epithelium-lined or (rarely) enlarged lymphatic spaces. Occasionally a cyst may occur in the deeper parts of the cornea from the bursting of an anterior chamber cyst through Descemet's membrane. The various hypotheses regarding the origin of these cysts are criticised, and the literature is given very fully.

ANGUS McNAB.

S. TOUFESCO. **On the Normal Crystalline Lens.** *Annales d'Oculistique*, August, 1906.

MLE. TOUFESCO has studied the lenses of a large variety of animals from the lowest to the highest possessing them, not only in adults but in embryos also. Details of many are given, together with the modes of preparation and staining. With

reference to the points specially dealt with in the paper, she comes to the following conclusions:—

1. The suspensory ligament of the lens is of mesodermic origin. Its development appears to be precocious and to correspond with that of the vascular system of the eye. The fibres of the ligament seem to traverse the ciliary body and to mingle with the elastic network which covers the ciliary muscle. There appears to exist a correspondence between the development of the ciliary muscle and the strength and disposition of the fibres of the suspensory ligament. At the level of the lens the fibres of the suspensory ligament are attached to the walls of the capillaries of the vascular tunic of the embryonic lens. In the adult a dense fibrous network encircling the lens seems to persist.

2. The lens capsule. Three varieties of epithelial cells are found on the anterior capsule—(a) Large central clear cells furnished with inter-cellular bridges. They appear to play an essential rôle in the nutrition of the lens. They have a large nucleus in a state of rest. (b) Small active peripheral cells provided with numerous filamentous processes. Active karyokinetic changes are evidence in these cells. Their function seems to be the defence of the lens against external influences. (c) Equatorial cells which gradually pass into the lenticular fibres proper in a meridional series. The nuclei are at rest, but they are not of the same type as the central cells, their chromatic network is less defined and their nuclei less visible. Their work is to bring about regeneration of the lens. These three varieties of cells, however, only represent the three stages of the evolution of the cells of the lens itself.

J. GRAY CLEGG.

A. ZAZKIN (Kusk, Russia). **Two Cases of Choroiditis Ossificans.** *Wochenschrift für Therapie und Hygiene les Anges*, Dresden, October, 1906, p. 4.

ZAZKIN describes a couple of very interesting cases where eyes damaged in early life by severe ophthalmia became the seat of internal changes which threatened sympathetic disease.

In the first case, that of a servant girl, aged 26, there was at the time of examination well-marked trachoma. The right eye

had been blinded in childhood and had no vision, and for the last year there had been pain in the eye and about the temple. The left eye was tearful, and had vision equal to 0·7. The right eye was removed. When hardened and cut it was found to be atrophic in all its essential visual parts, whilst in the choroid was a large shell of bone surrounding the optic nerve and reaching forward to the equator of the globe. It was 2·5 m.m. thick about the optic nerve, and thinned out to 0·5 m.m. at the equator. Sections showed it to be composed of true bone with a complete Haversian organisation. Behind this shell of bone the sclera was very hypertrophied, attaining a thickness of 4·0 m.m. at the posterior pole of the globe.

The second case was in a man of the same age—26. At the age of 20 years the man lost his right (? misprint for left) eye from gonorrhœal ophthalmia. Two or three weeks before the examination there was severe pain in the left eye, and the right eye was injected and tearful. The right eye showed nebulæ of the cornea, and a healthy conjunctiva, vision=0·6. The left eye was shrunken and hard to palpation, and had a central leucoma; $V=0$; the globe was removed. On section the eye was found to be atrophic, and in the wasted choroid was a large bony ring around the optic nerve embedded in connective-tissue; a second focus of bone formation was found just behind the ora serrata also embedded in connective-tissue and connected by thin strands of similar tissue to the large bony ring about the optic nerve. The ring was 4 m.m. thick at the optic nerve and 1·5 m.m. at its rim. Both pieces of bone showed typical histological features.

Zazkin briefly comments on the varying hypotheses of Pagenstecher, Knapp and Goldzieher put forward to explain these bony growths, and concludes, from the examination of his specimens, that the view of Goldzieher, that the ossification occurs in the lamina elastica and the stroma of the chorio-capillaris is the most likely, but he does not support this adhesion with any definite reasons.

He gives some of the literature of the condition, and includes the paper by Snowball (*Trans. Oph. Soc.*, Vol. xxiii., p. 217), which is the most excellent paper on the subject in recent time.

N. BISHOP HARMAN.

CLINICAL NOTES.

DISEASES OF THE ACCESSORY SINUSES AFFECTING THE EYE.—Fish considers to be unsatisfactory Ziem's explanation of eye symptoms in certain cases of disease of the accessory sinuses of the nose, viz., that these are caused by deficient oxygenation of the blood from hindered nasal respiration. His objection is based on the fact that in some of these cases nasal respiration is not interfered with at all, and he propounds the suggestion that there may be a stasis in the circum-orbital circulation, the result of a vaso-dilatation resulting from an irritation of the sympathetic by the secretion pent up in a closed sinus. He gives an account of several cases illustrating different forms which the affection of the eye took, some of these having been previously published by other surgeons, and adds a few of his own. Panophthalmitis, abscess of the cornea, irido-cyclitis, failure of accommodation, asthenopia and other indications have been noted, and in more than one instance a form of inflammation which was mistaken for sympathetic ophthalmia. Farlow related one case in which an ophthalmic surgeon recommended enucleation of a normal eye where the whole trouble was due to sinusitis. Fish appears to consider, too, that glaucoma may in this way also be set up, and that the pain, which may persist even after iridectomy and actually after enucleation, may have its origin in the morbid state of the sinus. He concludes his paper with a brief note of a case in which failure to recognise sinus disease led to the following dire experiences of a patient at the hands of various physicians and surgeons:—The patient was a man aged 42, who during ten years had been sent a voyage, been in an asylum, left his work and taken to gardening, had several months of electrical treatment, underwent the Salisbury treatment, was operated on for hydrocele, had spinal treatment for three months, had glasses fitted for supposed eye-strain, was operated on for stricture, was castrated though his testicles were perfectly sound, was circumcised, had his pubic artery ligatured, was operated on for hæmorrhoids, had his spine cauterised, the muscles of the eye tenotomised, and, finally, had a healthy eye enucleated. Three days after drainage of "an accessory sinus disease" the patient resumed his proper work, a healthy man. Fish considers that one should certainly be on the look out for sinus disease in presence of retro-ocular

cedema, sluggish pupil, involvement of an exterior muscle of the eye, and an idiopathic inflammation of the orbit or within the globe.—*New York Medical Record*, November 3rd, 1906.

RESULTS OF CATARACT EXTRACTION AFTER FORTY-TWO YEARS.—A woman, now aged 79, had her right eye operated upon for cataract by von Graefe in 1864, when she was 37. Iridectomy was first performed, and after an interval of some weeks the cataract "was punctured five times." The left eye was not touched, and at the present time has a dense shrunken cataract. The right eye has had useful and much-used vision since 1864, and now (November, 1906) reads $\frac{6}{18}$ and Snellen 0.5. There is a rather ragged colomaba of iris upwards, and some remains of capsule adherent to the margins of the iris. The vitreous is clear and the fundus normal except for a fairly large myopic crescent. The patient still has attacks of erythropsia. She is one of 13 children, of whom 2 died in early childhood. The 11 who lived to adult life were *all* affected by cataract; their father was similarly affected, but no information can be obtained of former generations.—J. B. LAWFORD.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

December 13th, 1906.

The President, Mr. PRIESTLEY SMITH, in the chair.

CARD SPECIMENS.

Albuminuric Retinitis in a Child, aged 7 years.—Mr. Arnold Lawson.

This was the case of a female child, well-nourished, whose father and mother both died of Bright's disease. In April, 1906, the child had Scarlet Fever, followed in a fortnight by an attack of Measles. Since convalescence rheumatic pains developed in the back with occasional irritability of manner; and six weeks ago there was a history of vomiting extending over a period of 6 weeks.

R.V. $\frac{6}{18}$. Each eye had H. of 5D correction of which, however, gave no improvement. The general condition showed some hypertrophy of the heart with thickening of the vessels. The urine, when first examined, was 1010 sp.gr., with neither albumin nor casts, though when

regularly examined a trace of albumin was frequently found but no casts. By ophthalmoscopic examination both discs were seen to be fluffy, with much distension and tortuosity of the veins; the arteries were pale and thready, and in places indistinct; there were many soft white patches about the macula region in both eyes, and a typical star-shaped figure at the yellow spot. All these ophthalmoscopic appearances have improved under treatment.

The case, which was an unusual one, gave rise to considerable discussion, with regard to the etiology and the pathological type of kidney likely to be present in cases of retinitis found in children of this age.

Partial Albinism with Nystagmus.—Mr. Leslie Paton.

L.D., aged 27, was the eldest of a family of 10. The parents were first cousins, one brother (the fourth in the family) has a similar condition, the others being all dark. The father was fair when a boy, the mother was dark. The mother's sister was very fair as a child, but became darker as she grew older. There were no other congenital abnormalities in this case, the irides were light blue, the hair very light golden, and there was absence of retinal pigment.

R.V. $\frac{6}{60}$, L.V. $\frac{6}{60}$, with the following refractive error, correction of which produced no improvement.

$$\text{R.E. } \frac{-1 \text{ D Sph}}{-4 \text{ cyl } 170^\circ}$$

$$\text{L.E. } \frac{-2 \text{ D Sph}}{-3 \text{ cyl } 160^\circ}$$

Mr. Paton also mentioned a case originally seen by Mr. Nettleship, where the vision did improve with correction after wearing glasses for some time, thus showing that there is some hope of eventually securing better vision with the use of glasses.

Partial Albinism with Nystagmus.—Mr. A. Levy.

J.S., a female, aged $2\frac{1}{2}$ years, was brought to Moorfields with the history of nystagmus, which had been noticed 18 months. The nystagmus ceases for a short time on fixation. The child's parents were cousins, and several of the relations were described as very fair, but there was no true albinism traceable anywhere in the family history. The child had fair hair, the irides were blue, and the retinal pigment was deficient.

PAPERS.

Adhesion of a Persistent Pupillary Membrane to the Cornea in the Eye of a Cat.—Mr. E. Treacher Collins.

In this paper, Mr. Collins remarked that similar cases had been described already by Beck, Samelsohn, Makrocki, Zirm, Vossius, Silcock,

and others; but on only four occasions had microscopical examinations been available; these were made by Wintersteiner in 1893, E. T. Collins in 1894 (*The Lancet*), von Hippel in 1905, and by Ballantyne in 1905 (vol. xxv. of the *Transactions of the Ophthalmological Society*, where the whole subject was very fully discussed).

The subject of the present investigation was a cat, one year old, which was found to have, on the posterior surface of the cornea in its right eye, at about the centre of the line of junction of its upper and middle thirds, a small, irregular, circular, pigmented patch. Proceeding backwards from this pigmented patch across the anterior chamber to the anterior surface of the iris, were a number (about 15 to 20) of delicate thread-like filaments varying in thickness, some much pigmented, others of a reddish colour as if carrying a blood-vessel. The position where they joined the iris corresponded to its small circle, a short distance external to the pupillary border. Some of them seemed to be prolongations forwards of the teeth-like processes forming the notched margin of the small circle. Many of the fibres started from the iris by several roots, which united to form one; others just previous to joining the cornea split up into several finer filaments. In all other respects the eye appeared normal.

The cat having been killed with chloroform, the eye was subjected to a microscopical examination, when it was found that the strands were composed of tissue having the same structure as that of the iris, and appeared to consist of prolongations of this structure. Their external surface, like the iris, was covered by a layer of exceedingly flattened endothelial cells; and there was no round cell infiltration to be seen anywhere. The filaments narrow as they cross the anterior chamber and widen out again on approaching the cornea, and at the part of the cornea where the union takes place is a plaque of specially densely pigmented tissue, which occupies a larger area on the back of the cornea than is necessary for the mere insertion of these filaments.

In bleached sections the patch on the back of the cornea is seen to consist of closely-packed, spindle-shaped cells, containing blood-vessels. Where this tissue is present, Descemet's membrane is absent, the latter apparently being replaced by the former; one section shows a break in the continuity of pigmented tissue, and here is seen well developed Descemet's membrane with an endothelial lining. In one place Descemet's membrane is continued on the side of a filament for a short distance eventually to become lost in the epithelium lining the processes. At the outer border where Descemet's membrane ends, the spindle-shaped cells begin. Flattened endothelial cells can be made out on the posterior surface of the patch, and anteriorly it passes insensibly into the substantia propria of the cornea. All other parts of the cornea are normal.

In nearly all the cases previously described, the filaments were non-vascular, though in von Hippel's case a vessel was observed. The pigmented patch at the back of the cornea is also an unusual feature, since in the other cases the patch although present contained no pigment.

The abnormality may be accounted for in one or two ways, viz. :— (a) as a result of inflammation, and (b) as a result of faulty development. In support of (a) we find cases of adhesions to the back of the cornea from perforation following Ophthalmia Neonatorum. In 1894 Mr. Treacher Collins published a case of an infant 3 months old, in which a piece of pupillary membrane was found adherent to the cornea, and in this case at the point of junction the endothelial lining was absent but not Descemet's membrane. A similar case was described by Ballantyne where the defect was also in the endothelial lining.

In a case described by von Hippel of a child 3 days old, with many other abnormalities in the eye and in other parts of the body, there was an adhesion of pupillary membrane to the back of the cornea, and at this point both Descemet's membrane and the endothelium was absent.

The cases showing this special abnormality may therefore be divided into 3 classes :—

1. Cicatrix from a perforating ulcer.
2. Normal cornea with defect in the endothelium where adhesion has taken place.
3. Normal cornea, except for the absence of Descemet's membrane, together with the endothelium where the papillary membrane joins the cornea.

Ballantyne explains the phenomenon by the theory of intra-uterine inflammation in which there is no permanent new formation, the inflammatory processes having undergone complete resolution.

Mr. Collins favoured the theory of faulty development; the failure of separation of the two different substances developed from the same mesoblast. Von Hippel puts the theory of perforation out of the question unless one assumes complete healing; also the theory of an inflammatory deep-seated ulcer; so that he is forced to regard the abnormality as a result of arrested development.

In certain early foetal stages there is a space between the lens and the surface epiblast which is filled with undifferentiated mesoblast, but there is no hyaline membrane. Between the 1st and 2nd months a very fine hyaline layer makes its appearance in this tissue, which is the commencement of Descemet's membrane. From the part anterior to the hyaline membrane is developed the cornea, and from the posterior part is developed the endothelium and the peri-vascular sheath of the lens. Should an arrest of development take place in connection with a portion of the hyaline layer, and in the differentiation of the mesoblast

into two parts, we get pupillary membrane and substantia propria of the cornea in contact. On the other hand, if an arrest of development occurs in the differentiation between the endothelium and the pupillary membrane in the mesoblastic tissue posterior to the hyaline layer, the absence of endothelium would make the pupillary membrane united to Descemet's membrane as in Ballantyne's case and Mr. Collins' first case. On these grounds the balance of evidence seems in favour of arrested development.

The paper was illustrated with lantern slides.

A Flat Sarcoma of the Choroid.—Messrs. L. V. Cargill and M. S. Mayou.

In August 1904 a man aged 61 came complaining of failure of sight in the left eye, which he had noticed for about 2 months. The pupil was active, the tension, media and optic disc were normal.

On ophthalmoscopic examination an irregular patch, somewhat like a patch of chorio-retinitis, was seen $1\frac{1}{2}$ disc diameter to the outer side of the macula, covering an area rather larger than the optic disc. The retina in this situation had an opaque œdematous appearance, and a vein passing over it was distended. At the lower border were three or four collections of pigment, but there was no elevation. A relative scotoma existed corresponding to the fundus lesion.

$$\text{L.V. } \frac{6}{0}; \text{ with } \frac{+5 \text{ sph}}{+1.5 \text{ cyl } 30^\circ} = \frac{6}{18}; \text{ with } \frac{+3.5 \text{ sph}}{+1.5 \text{ cyl } 30^\circ} = \text{J2}$$

R.V. $\frac{6}{9}$; with +1 sph. = $\frac{6}{5}$. The fundus and media in the right eye were normal.

There was nothing abnormal in the previous history, and no injury. A fortnight later there was no change in the appearance of the fundus; and from this time the man was lost sight of for 12 months.

The absence of any ascertainable cause, together with the solitary character of the focus in one eye only, suggested the question of the patch being of the nature of a neoplasm.

In August 1905, the patient appeared again, when the left eye showed a partial detachment downwards and outwards, along the borders of which was a collection of very dark choroidal pigment. The tension was normal and the vision $\frac{6}{24}$. Leber's trans-illuminator was applied, and on the temporal side between the equator and the ciliary region there was no pupil illumination, though above and below it was good; the diagnosis was now definitely regarded as one of sarcoma of the choroid. In March 1906, the man returned with an attack of secondary glaucoma; the lens was pushed forward, there was complete

detachment, the tension was +2 and the vision was reduced to bare perception of light. Consent was now given for the eye to be excised, which was accordingly carried out.

The pathological examination, conducted by Mr. Mayou, revealed a complete funnel-shaped detachment of the retina, and in the outer half of the globe a flat, darkly pigmented growth was seen with very indistinct limitations. The amount and distribution of the pigment varied greatly in different parts of the tumour. The optic nerve was free and the sclera was not involved.

Microscopically the growth was found strictly limited to the choroid, the membrane of Bruch being still intact. Posteriorly it was composed of spindle cells staining well, with here and there a few large chromatophores; anteriorly there was some degeneration and a few small hæmorrhages. In the periphery of the tumour was an enormous proliferation of chromatophores in the choroid.

In some respects the tumour in this case was unlike the ordinary flat sarcomata previously described, inasmuch as there was no tendency to alveolar formation, nor was there any involvement of the surrounding structures.

This case afforded an excellent opportunity of observing the clinical appearances seen at an early stage of flat sarcomata, and is an example of the care which must be exercised in diagnosing between certain apparently inflammatory conditions and commencing new growth. It also illustrates the value of trans-illumination.

This makes the 37th case of its kind which has now been described.

Perforating Wound of the Globe, with Total Destruction of the Iris and Restoration of Sight.—Mr. Cecil E. Shaw.

A.B., an engine driver, aged 37, came for advice on September 26th, 1906, with the history that 5 hours previously he had been removing the tyre from a bicycle when the wrench that he was using flew up and struck his right eye. On examination it was found that the cornea had been cut straight across about the junction of the lower with the middle third; there were tags of débris protruding from the wound, and the anterior chamber was full of blood.

The eye was carefully washed out, atropine was instilled; and as there was no pain it was decided to watch the case for a few days before proceeding to perform excision, which at that time appeared to be the most probable line of treatment. There was some chemosis for the next day or two, but this soon quieted down, and in 8 days the anterior chamber was sufficiently cleared of blood for a further examination to be made. A few tags still remained at the site of the corneal wound, and the iris was found to be entirely absent. A month later the

anterior chamber had quite cleared, and the lens could be seen behind in the usual situation completely unharmed. The eye gradually improved, and on November 30th the vision was $\frac{6}{12}$ partly, the cornea quite clear, a few fluffy vitreous opacities, and the fundus was plainly seen and normal.

To the Editor of the "Ophthalmic Review."

31, Merrion Square, Dublin,
December 13th, 1906.

DEAR SIR,—

In the last number of the "Ophthalmic Review" Mr. McMillan contributed a short article entitled "A Squint Memoriser," accompanied by a diagram which he calls the Union Jack of squints. I was greatly interested in Mr. McMillan's communication, inasmuch as I have been using the very same diagram for teaching purposes, for the past few years. A description of it will be found in the ninth edition of the "Handbook of Diseases of the Eye," which appeared a couple of weeks ago under the joint authorship of Mr. Swanzy and myself. The new diagram is merely a combination of the two which I formerly used (see "Ophthalmic Review," Vol. v.). Mr. McMillan has appreciated the advantages of combining the two earlier diagrams, as I did myself long ago. He has added horizontal lines to represent the action of the internal and external recti. I have omitted them, as the action of these muscles is so simple; furthermore, the lines being horizontal, they do not indicate the position of the false image, say, of a vertical candle, as the oblique lines do, but they only indicate the direction in which it is displaced. This is, however, only a matter of slight importance, and is not likely to mislead.

Yours truly,

L. WERNER.

TRANSIENT OPHTHALMOPLÉGIA EXTERNA ASSOCIATED WITH ATTACKS OF SEVERE HEAD-ACHE.

By J. HERBERT FISHER, M.B., B.S. (Lond.), F.R.C.S.

It has been to me a matter of some difficulty to decide under what title I ought to record the following five cases. There is room for speculation as to the diagnosis of any one of them—they are, however, in all probability, closely allied to those collected and reported by Holmes Spicer and Ormerod in Vol. xvi. of the *Transactions of the Ophthalmological Society*; Spicer and Ormerod demurred to the older name of ophthalmoplegic migraine, and chose as the title for their paper “Recurrent Paralysis of Ocular Nerves”; they rightly point out that the headache which precedes the ophthalmoplegic attacks is not the type of headache which forms a constituent part of the complex functional entity known as migraine; and that the term ophthalmoplegic migraine is undesirable in that it tends to detract from a search for any organic lesion which has been proved to exist in some and probably is present in all the cases which rightly belong to this class; moreover, in their own cases the patients were not the subjects of true migraine, though in some of them a family history of hemicrania was elicited. The pain in these cases is of great severity and is very variably situated; it is not necessarily unilateral; of those which I here report, the preceding pain was occipital in two cases, occipital followed by retro-ocular in one, primarily retro-ocular in one, and in one involved the temporal malar and frontal regions of one side. Of the two occipital cases, one, in whom the occipital and suboccipital regions were especially involved, had all his life been liable to typical hemicrania. In 1886, he had had a

transient attack of obscuration of vision in the left eye, and in 1894 and 1895, two attacks in which the sight of the right eye became temporarily obscured; one of these last attacks, he recollected, was preceded by his severe occipital neuralgia which he greatly dreaded; sight quickly returned and was fully restored in each instance in a few days; in 1905 a similar attack of occipital neuralgia left a temporary paralysis of one half of the tongue. In the other occipital case the pain was located at the apex of the table of the occipital bone; a bi-temporal scotoma preceded the mid-line pain which led up to violent retching, terminating eventually in vomiting with relief of symptoms. Few opportunities have occurred for autopsies on cases of so-called ophthalmoplegic migraine, but in one of them Gübler found plastic exudation in the basal subarachnoid spaces, with fibrous adhesions round the origin of the third nerve extending forwards to the chiasma. Other post-mortem examinations have shown a fibroma or chondro-fibroma amid the fibres of the ocular nerve involved; nuclear lesions have been looked for but never found. Of the cases I report below, in one there had undoubtedly been a previous attack of ophthalmoplegia, and by another a history of an attack of transient diplopia previous to the one for which he consulted me was given; the other three patients had never had an attack of double sight before the one for which I treated them. I have therefore chosen the word "transient" rather than "recurrent"; as more cases of this character are collected they may quite probably be found to group themselves into different classes when their pathology becomes more firmly established. More knowledge is also needed about what may perhaps prove to be an allied group, herpes ophthalmicus, associated with extraocular paralysis.

H.F., male, æt. 22. A grocer's assistant. Came to St. Thomas's Hospital on August 12th, 1903. Had been at the hospital two years before, and recollected that at that time

he was said to have had paralysis of the right internal rectus. It improved, but for a long time at least he sometimes saw double when looking to the extreme left. His father was, to my knowledge, a man who drank to excess, and died of alcoholism. The patient is not alcoholic, and never had venereal disease. He suffered from fits for six months when seven years of age. He is inclined to get headache at the back of the eyes, especially if he misses a meal. On August 3rd, 1903, he had severe headache, mainly at the back of the right eye; it felt like a bruise. At this time the diplopia which he had experienced two years before began to re-assert itself, and when he came to the hospital on August 12th it was constant when he was looking to the left side. He had recently been apt to feel dizzy when hurrying or making muscular efforts. There was no affection of speech or memory; sensation over the fifth nerve areas was normal. Knee-jerks normal. V. of R. eye $\frac{6}{6}$. P. normal in size and action. L.V. $\frac{6}{9}$ c-0.25 D sph. = $\frac{6}{6}$. The movement of adduction of the right eye was very defective, but not quite in abeyance; other movements full. The left eye showed jerky nystagmus in looking to the extreme left, but all its movements were of full range. Ophthalmoscopically, everything was normal. The heart's apex was found to beat in the left nipple line. He was ordered a mixture of iodide and bromide.

September 9th, 1903. States that since onset of the double vision he has observed that a dimness of sight comes over the left eye if he gets hot or excited. A large vein on the left disc makes a horse-shoe curve in passing into the head of the nerve, and pulsates very conspicuously and to a varying degree while under observation. I gave two blisters and continued his mixture. On September 16th, 1903, he had an attack of headache from 7 p.m. till midnight; it was gone by next morning. Later I gave him for a month an acid strychnine mixture. On November 4th, 1903, I sent him to one of my medical colleagues: he agreed to my diagnosis of "ophthalmoplegic migraine," and suggested bromide and gelsemium, which was given; he found no other cranial nerves involved. On November 23rd, 1903, I thought some power was beginning to return in the right internal rectus muscle. On January 4th, 1904, the diplopia was causing him but little trouble, but there was still some deficiency of adduction in the right eye. On March 7th, 1904, he was no longer complaining of much practical inconvenience, but still carried his head rotated

towards left shoulder to avoid diplopia. On April 11th, 1904. He had had no treatment for six weeks. Ten days ago, and again yesterday, he had had headaches at the back of the eyes; it was worse on the right side; lasted from 1 p.m.—9 p.m.; he seemed at the time to see objects jerking together, the sight being dim. These headaches were accompanied by nausea, but no vomiting resulted. No exacerbation of his diplopia resulted. I saw him again a fortnight later, during which time he had taken iodide and bromide; no recurrence of the headache had taken place; there was still a residuum of defect in the right internal rectus.

A.I., male, æt. 33. Clerk. At St. Thomas's Hospital February 22nd, 1904. Not liable to headaches. Fourteen days ago began to have severe neuralgic pain of shooting character involving left side of forehead, left eye and left temporal and malar regions. He had never before had any pain of this description, and stayed in bed one day on account of it; there was no vomiting. When the pain went, the exact date not being noted, he saw distant objects double, and this had persisted. I examined him with the candle test, and concluded that the left eye was directed higher than the right, and I deduced that the right superior rectus was the muscle at fault; this conclusion was, however, erroneous. There was no affection of sensation over the fifth nerve areas, and no tenderness of any of the trigeminal branches. The fundi were quite normal. I told him to shade the right eye when out of doors, and gave him a mixture of potassium bromide and iodide. A week later he found the double vision less troublesome. A fortnight after his first visit he stated that he much appreciated the shade over the right eye which relieved him of aching which he at once experienced when both eyes were uncovered. Noting the discrepancy between left-sided pain at the onset of the diplopia and paralysis of a right extra-ocular muscle, I questioned him further. He confirmed his original statement that the pain was all left-sided, and stated that even now the fore part of the scalp on this left side was slightly tender. I therefore tried the candle test again, and noted my results as follows:—"Candle test shows that left eye is directed higher than the right, but there is no doubt whatever that the vertical interval between the images is much greater when the eyes are depressed than when they are elevated. The mistake I made a fortnight ago arose, I think, from confusion owing to the

appearance of a lateral displacement of images which appears when he raises the eyes after they have been depressed. He carries the head depressed, suggesting strongly a defect in depressor and not in elevator muscles, and as the left eye points higher than the right, it is obviously a depressor of the left eye which is at fault. The vertical interval between images is conspicuously greater when the eyes are turned down and to the right than when they are turned down and to the left, *i.e.*, it is greatest when the left superior oblique is the main power for depressing this eye and least when this muscle is especially out of play as a depressor and the inferior rectus mainly responsible for effecting the movement of depression. The left superior oblique is clearly at fault. Nothing abnormal can be felt in the region of the pulley of this muscle. The acuteness of vision of each eye is quite full and the fundi are normal." Advised to shade the left instead of the right eye. Three weeks later he no longer hung the head. The day before this visit, a Sunday, he had not used the shade to exclude either eye, and was quite comfortable till towards evening; then the left eye began to ache; he covered it then, and was at once comfortable. He had found covering the left to be more efficient than covering the right; it at once relieved any discomfort.

A fortnight later he said he saw double only on rare occasions, and had not found it necessary to wear the shade at all during the preceding week. A month later he paid me his last visit; he then had no diplopia, and considered himself quite well. As his only remaining symptom, he told me that if he lightly stroked his left eyebrow he experienced a sensation of tingling which extended back into the scalp beyond the top of the head in the area of distribution of the left supra-orbital nerve.

J.F.A., male, æt. 30. An actor. Not prone to migraine. Three years ago was said to have lung trouble; spent four months at Torquay; is now said by his doctor, a very competent man, to be sound. Has been touring with theatrical companies ever since his recovery. I saw him on May 11th, 1906; fifteen days before, he was awakened in bed by violent headache at the back of the head; it lasted 36 hours, going off the next evening but one; the day following cessation of the pain he felt rather prostrated, but travelled with his company; on the next morning he was awakened again by pain of the same character, but it was this time located in the orbits, mainly in the right and

not at the back of the head. He saw a doctor, but went on the stage that evening; the following morning the headache was gone, but the sight was all confused, and he persistently saw two images; this point was reached ten days before I saw him, but he continued to act for another four days; then he came to town and saw his doctor, who ordered a blister and biniodide mixture. The only venereal history was a mild attack of gonorrhœa eight years before. His doctor recognised paralysis of the right external rectus muscle. This view, however, requires modification; with the candle test I found the diplopia was crossed and not homonymous; the candle was placed about $1\frac{1}{2}$ metres from the patient; when the eyes were lateralised horizontally to the right there was no vertical interval between the images; when the eyes were turned horizontally to the left there was a vertical interval of 12 inches; the image of the right eye was always below that of the left; the conclusions are that the right eye is displaced upwards as well as outwards, and more upwards when the eyes are turned to the left; its adducting depressor, the inferior rectus, and not its abducting depressor, the superior oblique, is therefore the muscle at fault; he liked to keep his eyes turned down and to the left; in this position the depression is of course almost entirely effected in the right eye by the superior oblique, and the inferior rectus of this eye is scarcely in action.

The sight of each eye was quite full, and the fundi normal. To superficial observation no limitation of movement could be appreciated; it was a case of paresis, and not paralysis of the inferior rectus. I was not sure that the right eye was not a shade more prominent than the left, but it certainly was nothing more than may have been natural to the patient. On the 16th May I heard he was improving, and on the 24th May, *i.e.*, in 23 days from time of onset, he was well; all diplopia had disappeared.

H.F., male, æt. 55, saw me privately on May 24th, 1906. Had been a civil servant in India, finally coming home in 1899. He had suffered from typical migraine headaches from boyhood; scintillating scotoma, followed by headaches leading up to vomiting with relief of the headache. He is a high myope: R. -14·0 D getting $\frac{5}{6}$ very fairly; L. -13·0 D getting full acuteness; he uses R. and L. -10·5 D sph. for distance and -6·5 D sph. for near.

In addition to his bilious headaches he has long been liable

to attacks of much more severe and persistent pain, which he dreads much worse than the migraine, and describes as neuralgic in character and attacking the occipital and sub-occipital regions. In 1886 he was sent home from India on account of choroiditis, and saw Nettleship; the patient now has not very extensive and quite well-limited myopic crescents; he says Nettleship attached no importance to the choroiditis. While at home in 1886, however, he states that he had an attack of diplopia. Nettleship found it was the left eye which was at fault; it got well. In 1894, he had another attack of visual defect, which also got well. The relationship of these two attacks to immediately preceding migraines or occipital neuralgias he could not at this date give me. In the summer of 1905 he had a "neuralgia" accompanied by much persistent vomiting. His doctor, a quite reliable man, saw him, and says that weakness of one side of the tongue developed; he did not record which side, but his belief is that the tongue was protruded towards the left side. On April 9th, 1906, one of his characteristic attacks of occipital neuralgia again developed; he dieted himself, and it subsided in three or four days. A few days later it returned; this time was accompanied by vomiting, but again subsided in a few days; after another short interval a third onset of the same neuralgia occurred, and during this attack, about a month before I saw him, he awoke one morning and found the right eye affected; he noted pictures on the wall of his bedroom crooked, but could see them straight with his head turned to the right and the eyes to the left; one eye would not work with the other. The condition has persisted as he first observed it. I found he had no power of abduction of the right eye beyond the mid line; there was homonymous diplopia; no tilting of images; no wheel-like rotation of globe in performing movements of elevation and depression, which were quite full. It was a pure right sixth nerve paralysis. The fields of vision, which I charted, were full. Before I saw him he had been thoroughly investigated by a physician in London, who could find no general or nerve disease. Urine normal. Heart and blood-vessels sound. Pulse tension normal. The fundi were normal except for harmless and not remarkable myopic crescents. He had not had syphilis.

From his doctor I have learnt the following facts in regard to the progress of this case:—In September, 1906, the right eye had recovered some power of abduction, but could not be turned fully outwards; diplopia still persisted; on November

11th, 1906, his doctor wrote me: "He is very much better; his eye moves perfectly; at least if I saw him for the first time I should say there was nothing wrong; he can read and write without discomfort, but he still occasionally has a transient diplopia. He has had no more 'neuralgias,' and looks very well."

By the kindness of Mr. Nettleship, who saw this patient in 1886 and 1895, I am able to trace this patient's ophthalmic history for twenty years. On January 10th, 1886, at Benares, the vision of the left eye failed in a day or two; "a cloud over it;" it soon improved, but relapsed a little about February 3rd, 1886; some metamorphopsia persisted for a time; he returned home, and saw Nettleship on March 18th, 1886, by which time he thought the eye as good as ever. Nettleship noted R. $-10\cdot D^{\frac{6}{9}}$, L. $-10\cdot D$, or $-11\cdot 0 D^{\frac{6}{9}}$. Ophthalmoscopically after mydriasis, myopic crescents in both, larger and more ragged in left; Y.S. region normal in each; no choroidal atrophy except crescents, but choroids spaced and the interspaces pale in both eyes. Discs red and hazy with sharply-cut slipper-cups opening towards temporal sides; nasal side of left disc decidedly swollen. The patient had no central colour defect. Nettleship's examination, supplemented by the report of a doctor who had seen the patient in India at the end of January, led him to think the case had probably been one of retro-bulbar neuritis. Further facts noted at this time were that the urine was normal; that from boyhood he had suffered from sick headaches, always cured by sleep; that he had had bad fever in 1882-3, and came home for it; that since 1883 he had developed attacks of a new type of headache; unilateral and lasting some days; extending from the forehead and around the eye to the back of the head; latterly they had most often been experienced on the left side. This headache and the old form are mixed, the new form not being very frequent.

In 1895 he again saw Nettleship. He had been at home for his health in the autumn of 1894, and he had "neuralgia" chiefly at the back of the head and neck; in connection with this pain, at the end of October the sight of the right eye failed rapidly, "like a great dimness;" he was prescribed salipyrine, and it got better. He returned to India in December, 1894. On the morning of either February 27th or February 28th, 1895, he was shooting from an elephant, when the right eye again became suddenly, instantly, almost blind; "he could see light with it, but could not see his own boots;" it cleared

partly in half an hour, and in two or three days was nearly well. There had been slight dimness of the right eye earlier in the morning of the day on which the above obscuration occurred, but half an hour before the major obscuration, when on the elephant, he had tested the right eye by sighting something with it and had found it good. Since this attack he had been troubled by some metamorphopsia or micropsia, and when reading by a "churning" movement.

On July 13th, 1895, R. c - 11.0 Ds. $\frac{6}{9}$, L. c - 11.0 Ds. $\frac{6}{9}$, $\frac{6}{6}$ with difficulty. Ophthalmoscopically, Nettleship found the right disc paler than the left, and probably too pale; he thought its veins smaller and straighter than those of the left; but in 1886 he had expressed this contrast differently, when, on June 10th, of that year, he had noted: "The left retinal veins are certainly larger and more tortuous than the right. For the last few days since a 'cold' occasional diplopia for distance with his glasses on." Nettleship did not lay much stress on this diplopia; it appears to have been the only attack of double sight previous to that for which he consulted me, unless his history of "metamorphopsias" or "churning movements" ought to be so interpreted. The whole case is of much interest, and affords abundant ground for thought and speculation.

A.B., female, æt. 32. At Moorfields Hospital July 28th, 1906. When retching in a bilious attack last night, struck her forehead a slight blow on the back of a bedstead. There was a little bleeding from right nostril. Patient came on account of diplopia and confusion of vision. Either eye had an acuteness of $\frac{6}{6}$. Pupils were equal and normal in action. There was internal squint of the right eye and complete loss of all power of abduction. Ophthalmoscopically all was normal. Was told to shade the right eye; given a dose of calomel and an acid aperient mixture. Four days later the "bilious attack," so-called, was over; she had still total loss of abduction of the right eye. Iodide and nux vomica were ordered. A fortnight later, on returning from my holiday, I saw her for the first time. I found that she had been liable to these "bilious attacks" for many years; ten years ago she would have one every week; now one recurred only every three or four months. There is no family history of migraine. Onset of the attacks is very definite, and I think unusual; a shadow first comes over the sight of the left eye from the temporal side; this is

followed by a similar shadow coming over the sight of the right eye from its temporal side. In a few minutes the visual defect passes off, and is followed by intense supra-occipital headache, its site being indicated by the patient at about the posterior extremity of the sagittal suture; the headache is accompanied by persistent nausea and retching, and may last two or three days, when actual vomiting supervenes and gives her relief. The attack which has left the right sixth nerve paralysis did not differ from the above, the ordinary type. The bi-temporal nature of the scotoma and the mid line position of the headache are to me unusual, and afford grounds for speculation. One month later there was still diplopia, but much improvement in power of abduction of the right eye had been obtained; the improvement was progressive, and when I last saw her almost complete recovery had been reached.

REVIEWS.

C. H. USHER and HENRY FRASER (Aberdeen). **An Analysis of a Series of Consecutive Cases of Conjunctivitis seen in Aberdeen.** *Royal London Ophthalmic Hospital Reports*, June, 1906.

In this paper we have the results of the examination of 820 cases of conjunctivitis in Aberdeen. Clinically the following points are noted:—Locality; age; complaint; interval since onset; previous attacks; other people affected; the physical condition of the conjunctiva; amount and nature of the discharge; presence of complications, ulcers, phlyctenules, nasal or aural discharge. From these considerations the attempt was made to diagnose between the Koch-Weeks, diplobacillary, gonorrhœal, tubercular and diphtheritic cases, and the results were compared with those of bacteriological investigation. As the great majority of cases belonged to the first two groups, the value of the paper consists in the determination of the signs and symptoms of Koch-Weeks and diplobacillary conjunctivitis. The more difficult and probably more interesting differentiation between Koch-Weeks and pneumococcal conjunctivitis is not attempted for the reason that the latter was very rare in the series. The total number of cases examined was 820.

Koch-Weeks Conjunctivitis. The clinical forecast and bacteriological test agreed in 242 cases and disagreed in 120. Classified signs and symptoms in the pure Koch-Weeks cases as follows:—Age incidence, under 1 year, 21; 1—4 years, 56; 5—13 years, 158; over 13 years, 49 cases. Average time since onset, 6·9 days. Previous attacks in 33 out of 310; others affected in 207 out of 288 cases. Of 284 cases 255 had redness of both palpebral and bulbar conjunctiva; 29 palpebral alone; in 171 cases discharge was moderate, 94 scanty, and 19 profuse; in 43 were enlarged follicles; 58 conjunctival hæmorrhages; 223 swelling of lids; 90 enlarged pre-auricular gland; 2 chemosis; 4 membranous conjunctivitis; in nearly nine-tenths of the cases both eyes were affected. Complications: 3 corneal ulcer, 4 impetigo, 37 phlyctenules (only 5 of which were pure Koch-Weeks), 16 nasal discharge, 1 aural discharge. The diagnosis “cannot be based upon one or two symptoms alone, but must depend upon a consideration of several features, namely, age, history, and objective symptoms.”

With regard to the differential diagnosis, the authors give a very good comparison between Koch-Weeks and diplobacillary conjunctivitis. They very rightly describe the class of case which can be put down as “certain” Koch-Weeks, and quote many cases in detail where the diagnosis is probable. Regarding the time since the onset at which patients are seen, in 30 cases of certain Koch-Weeks, in 24, *i.e.*, 80 per cent., it was less than a week, and in 78 cases wrongly diagnosed as Koch-Weeks, in 58, or 74·5 per cent., it was more than a week. Previous attacks only occurred in 33 out of 310 cases, *i.e.*, 9·5 per cent. Conjunctival hæmorrhage when it does occur was held to be almost definite proof of Koch-Weeks. It occurred in 21·16 per cent. of Koch-Weeks cases, in 0·86 per cent. of diplobacillary cases, and 8·8 per cent. of other forms. Considering that in some localities pneumococcal conjunctivitis is quite common and in this condition conjunctival hæmorrhages occur fairly often, their diagnostic worth is only of value when deciding against diplobacillary conjunctivitis.

Diplobacillary Conjunctivitis. Group consisting of 321 cases, in 78 of which the bacterial examination showed wrong clinical diagnosis. Classified signs and symptoms in 238 pure cases:—Age incidence: 1—14 years, 10 cases; 5—13 years, 44 cases; over 13 years, 189 cases; 28 per cent. of all cases were in children under 14. Interval since onset, less than a week in only 70 out of 238, or about 30 per cent., but was shorter in children

than adults. Others affected in 69 out of 238, or 30 per cent. of cases, *cp.* Koch-Weeks 72 per cent. Redness of palpebral conjunctiva only in rather less than half the cases. Discharge: scanty 189, moderate 18, profuse 1; enlarged follicles 28; swelling of lids 114; hæmorrhages 2; pre-auricular gland 42, never chemosis or membranous conjunctivitis; angular conjunctivitis in 34·7 per cent.

Diagnosis depends on "grouping of age, history, interval since onset, previous attacks." Regarding age, the authors agree with the consensus of recent opinion, that children suffer freely from diplobacillary conjunctivitis; this is certainly the case in London. Previous attacks were relatively frequent. Others affected, in this respect the epidemics are smaller (family rather than school epidemics). The fact that the ocular conjunctiva was affected in about half the cases is not the ordinary experience, and probably indicates that many of the cases had also conjunctivitis *eczematosa*. As in Koch-Weeks cases, a certain number can be marked down as "certain." In the others the following points are given as of diagnostic worth:—(1) Angular conjunctivitis; (2) age; (3) interval since onset long in adults; (4) congestion limited to lids; (5) scanty discharge; (6) absence of hæmorrhages; (7) previous attacks; (8) cases from rural districts; (9) complaint of heavy lids.

Regarding the other groups of cases, the paper before us is of less value; regarding pneumococcal conjunctivitis, there is no evidence to support the statement "there are no clinical characters by means of which it is possible to make a diagnosis of the presence of the pneumococcus." To obtain any results we must consider a series of cases in which pneumococcal conjunctivitis is represented by more than 24 cases in 820.

The bacteriological work in this paper is admirable; it is only necessary to say that the Koch-Weeks bacillus was cultivated for forty generations in pure culture, to indicate the standard of excellence. There is much valuable information given concerning the methods of culture which gave these brilliant results, especially regarding the making of ovarian agar, for details of which the original must be consulted. The whole article is probably the most valuable which has appeared in English on this subject.

ANGUS MACNAB.

WIRTZ (Strassburg). A Case of Conjunctivitis with a Peculiar Secretion Due to the *Streptococcus Mucosus*. *Klinische Monatsblätter für Augenheilkunde*, October, 1906.

A CONSIDERABLE number of organisms have been described at one time or another as the cause of different forms of conjunctivitis, but only a comparatively few of them are frequent and widely disseminated. Wirtz found the *streptococcus mucosus* of Schottmüller in a case of conjunctivitis, and as this germ is of recent discovery (1903) it may be of interest to give its characters.

The patient was a woman of 60, with an acute conjunctivitis of fourteen days' duration super-imposed on old cicatricial trachoma with pannus. The congestion of the palpebral and bulbar conjunctiva was slight, but the discharge had a peculiar tough elastic consistence, and could be easily drawn out into long threads. It covered the cornea like a mass of dough of a greyish-white colour. The patient did not return for four months, and when she appeared again there was a central ulcer of the cornea which had almost perforated, and a small hypopyon.

Microscopically, the discharge consisted of fine fibrin with mucin and a few leucocytes. There lay scattered in the network numerous diplococci, sometimes in small chains, but always surrounded by a capsule, which was easily stained by Klett's and Heim's methods. They were positive to Gram's stain. The single cocci were mostly round; a few flattened in the axis of the chain, but none lengthwise, like the pneumococcus. No other organisms were present.

The cultural characters were the following:—Upon gelatine after 24 hours greyish-blue elevated colonies, the size of a pin's head. When numerous the growths coalesced, with single colonies at the margins. No liquefaction. Moderate growth in bouillon and glycerine bouillon, which became slightly turbid at the end of 24 hours with a slimy mucus deposit. After another 24 hours the medium cleared with increased deposit. Growth more luxuriant in glucose bouillon. Blood bouillon became turbid, and the blood sank as a deposit to the foot, with a red transparent zone above. Upon agar after 24 hours the colonies varied from pin's-head to the size of a lentil, and were glancing. With increased numbers there was a glassy

mucoid deposit surrounded by single colonies. Blood agar gave more luxuriant growths, with a faint greenish colour. Litmus-nutrose-agar gave the best results. Löffler's serum was similar to agar. Milk coagulated after four days. Litmus-lactose became slightly red after 48 hours. No growth upon potato or wort gelatine. No gas formation. Facultative anaërobe. Optimum temperature 37°C., but also good at 24°. Mice died between 12 and 48 hours after the injection of 0.1 c.cm. of a glucose bouillon culture. The post-mortem examination revealed exudation into the pleura and peritoneum with great enlargement of the spleen. The diplococci or short chains, surrounded by the capsule, could be obtained in pure culture from the blood, exudates and different organs. No lancet-shaped germs were seen. Polymorphism of the germs was noted from the different media, large and small forms being often seen together. At times there was the appearance of encapsuled short bacilli. Careful focussing, however, showed that this was due to two cocci lying close together. Neumann* thought these were involution forms, but Wirtz believes them to be young forms, just dividing, as they take on the capsule stains best. The chains were composed of distinct diplococci, possibly the name should therefore be *strepto-diplococcus*. The chains varied from 3—6 double groups, and were mostly straight or only slightly curved. Neither Heim's nor Klett's capsule stains were satisfactory in smear-preparations from the tissues. The best results were obtained from Giemsa's stain and 1 per cent. collargol.

The diagnosis between the *streptococcus mucosus* and the pneumococcus is most easily seen in film preparations, since the latter appears as a lancet-shaped organism, i.e., elongated in the line of the double members, while the former shows these forms, but is round or flattened in the line of the chain. Pneumococci from cultures are often round, but after passage through an animal the capsule and the characteristic shape re-appear. Upon agar the colonies are somewhat different, as the *streptococcus mucosus* varies in size from a pin's head to a lentil, and has a slimy appearance, whereas the pneumococcus colony is never larger than a pin's head, and is whitish. Finally, the *streptococcus mucosus* flourishes in litmus-nutrose agar, while the pneumococcus shows scanty growths.

The *streptococcus mucosus* has been found in the throat as a

* Neumann, *Zentralbl. f. Bakteriol.*, 1894. p. 481.

saprophyte, but also in pneumonia, middle-ear suppuration, parametritis, sepsis and meningitis. It is morphologically related to the saprophyte *leuconostoc*, a fungus which is much feared in sugar refining, where it causes a slimy fermentation. Hlava* therefore named it the *leuconostoc hominis*. The suspicion was raised in Wirtz's case whether a similar fermentation had not occurred. The conjunctival discharge, however, was mainly fibrinous, the amount of mucin (the only ingredient which could be regarded as containing a hydrocarbon element) being far too small to have given rise to fermentation. Attempts to produce fermentation of various kinds of sugars by means of the *streptococcus mucosus* failed. Lastly, experiments showed that the organism was not a saprophyte but a very virulent parasite.

The large numbers found in the secretion and the absence of other germs, as well as the peculiar nature of the discharge, are held by Wirtz as evidence that the *streptococcus mucosus* was the cause of the conjunctivitis in his case. This view is supported by the fact that E. Fränkel found a similar secretion in a case of lung inflammation, and Heim in a case of middle-ear disease.

Treatment by thoroughly washing out the conjunctival sac with a solution of 3 per cent. potassium chloride four to six times daily rapidly reduced the inflammation, and healing of the ulcer followed.

This paper appears to be an accurate description of one of the forms of the streptococcus. A considerable difference of opinion exists concerning the varieties, if any, of streptococci, and the frequent occurrence of diplococci, which one cannot specify, shows that a good deal of work has yet to be done to clear up these questions.

W. B. INGLIS POLLOCK.

ASK. Anthropometric Studies on the Size and Shape of the Orbital Margin in Swedes, with special reference to the Relation between Myopia and the Shape of the Orbit. *Zeitschrift für Augenheilkunde*, July and August, 1906.

A CONTROVERSY has for some years been carried on in Germany between the advocates and opponents of Stilling's theory of "school" myopia. Put shortly, the theory is that the chief

* Hlava, *Zentralbl. j. Bakter.*, 1902, p. 263.

factor in the production of those low or moderate degrees of myopia in which there is no disease of the fundus, is the pressure of the tendon of the superior oblique muscle as it passes from its pulley to its insertion. It is only during the period of growth in size of the eyeball that this pressure is important, and the more there is actual contact between the tendon and the eyeball the greater will be the tendency for the growth of the globe to take place in the direction of least resistance, *i.e.*, in the antero-posterior direction. Hence, according to Stilling, the position of the pulley is of great importance; the lower it is the greater the length of its contact with the globe, and since it is always lower in low orbits than in high ones, there is a direct ratio between the prevalence of myopia in any race of people and their orbital index, those races with a low orbital index being relatively more liable to acquire myopia. Put in this way, the theory seems to emphasise the racial aspect of the question in a way which may seem to leave the hygienic aspect out of sight, and it is probably for this reason that the late Professor Cohn and others specially interested in school hygiene have been inclined to look upon Stilling's theory as a dangerous heresy.* But in truth there is nothing in the theory itself to belittle the importance of school hygiene. On the contrary, it explains better than any other theory how the maintenance of the downward and inward position of the eyeball for prolonged periods may be injurious to adolescents, and, further than that, it points to a method by which those children specially liable to develop myopia can be distinguished from others. The best way to test the theory is by careful measurements of the orbits in both myopes and non-myopes. It is a record of such measurements that is contained in the papers under review.

The height of the orbit is the greatest vertical distance between its upper and lower margins; its width needs more careful definition, and is taken by Ask to be the distance from the most external part of the temporal margin to the insertion of the internal palpebral ligament. The height, $\times 100$, divided by the width, gives the index, and orbits are divided by anthropologists into low, medium and high, according as their indices are respectively under 80, between 80 and 85, and over 85. In this classification the average appears to be put too low, for in all recent measurements the majority of orbits have had

* Cf. Report of International Congress on School Hygiene at Nuremberg. *Klin. Monatsbl. f. Aug.*, 1904.

indices over 85. The following figures bear on the relation between a low orbit and myopia:—

Hamburger, an opponent of Stilling's theory, measured 118 myopes, and found the proportion of those with indices less than 85 to those with indices greater than 85 as 24·6:75·4, or about 1 to 3. With 67 non-myopes the proportion was as 12:88, or about 1 to 7. Gelpke, out of 111 myopes, found those with indices less than 85 as 40:60, while out of 53 non-myopes the proportion was the same as Hamburger's, *i.e.*, 12:88. Moreover Gelpke found that of 11 cases with very low orbits, *i.e.*, with an index under 80, not a single one was found among the 53 non-myopes, but all among the myopes. Chery found, as a result of 250 orbital measurements, the average index in myopes among children, students and older people respectively, to be 81·3, 82·7, and 83·1, while the average index in non-myopes in the same three classes respectively was 92·7, 87·6, and 87·3.

Ask has undertaken an investigation on a larger scale, having taken as many as 1,032 orbital measurements and refractions among Swedish students and teachers. The average orbital index for the whole number was 86·32, that for the whole number of myopic eyes (343) was 83·29, that for the whole number of non-myopic eyes (689) was 87·83. If allowance is made for the soft parts the true orbital index of the skull in each case would be less by about 1·4—so Ask found by some measurements carried out in the post-mortem room—but the relative value of the above figures would remain unchanged. These results agree absolutely with those already mentioned, and tend to confirm Stilling's theory. It may at any rate be taken as proved that among students and teachers those who are short-sighted have on the average a lower orbital index than those who are not.

A circumstance which at first sight seems inconsistent with the above is that when we consider hypermetropes in relation to emmetropes no corresponding relation holds true, *i.e.*, the orbital index of the former is on the average no higher than that of the latter. This is explained by Ask as follows:—A hypermetropic eye is one whose growth has ceased unduly soon, and since it is only on the eye during its period of growth that the pressure of the superior oblique tendon has any important effect, it makes no difference, so far as hypermetropes are concerned, whether the orbit is low or high.

Another criticism that has been brought against Stilling's

theory is that among anisometropes there is little, if any, relation between the respective lowness of the two orbits and the length of the globes. In so far as the cases in which the measurements have been taken have been hypermetropic in one eye and emmetropic in the other, the objection has already been answered. In so far as they have been myopic in both eyes, the myopia in one eye being much in excess of that in the other, the condition has been in many cases due to disease with which the theory has nothing to do. In other instances Ask's measurements in 18 cases tend to prove that a relation, such as might be expected, does exist. In 11 of these the non-myopic eye had the higher orbital index; in 5 they were equal, and in only 2 was the higher orbital index found in the myopic eye.

These papers then are of some weight as supporting Stilling's theory, and the more so as their author set out, as he tells us, with no preconceived ideas in its favour. They also, however, afford some evidence as to the real importance of hygienic measures. From another series of measurements carried out on skulls Ask concludes that there is a direct relation between the shape of the orbit and the shape of the face, a low orbital going with a low facial index, and *vice versâ*. Now in Sweden it appears the predominant type of face is broad (chamaeprosopé), and, according to Stilling's theory, school myopia should be relatively frequent. This, it appears, was so 20 or 30 years ago, when more than half of the older students in the higher grade schools were myopic. In the interval much attention has been paid to seating and lighting and to the provision of suitably printed books. Still more important probably has been the greater interest taken in outdoor games and sports in recent years. The result, it appears, is that there has been a notable decrease in the number of myopes. Only 29 per cent. of the cases measured by Ask, all of them men who either were or had been students, were myopic in any degree.

A. H. T.

FRENKEL and GARIPUY. **Researches on the Blood Pressure in Cataract.** *Archives d'Ophthalmologie*, October, 1906.

Numerous have been the attempts made, hitherto in vain, to discover some general disturbance in nutrition as a cause of senile cataract. Not a few observers have magnified the

importance of arterio-sclerosis as an etiological factor, though on purely hypothetical grounds.

Frenkel and Garipuy undertook this research with a view to determining, by approved clinical methods, the relation, if any, existing between arterio-sclerosis and senile cataract. Basing their conclusions on the work of Potain and Huchard, that angio-sclerosis is always accompanied by a certain degree of increased blood pressure, the authors make use of the permanent arterial tension as a means of detecting the presence of angio-sclerosis. The apparatus employed was Laulanié's, which resembles that of Riva-Rocci, and every precaution was taken to place the patients under exactly the same experimental conditions as to food, rest, and posture. The normal blood pressure was taken at 130 m.m. of Hg. The maximum and minimum blood pressures were found for each patient, and the mean general blood pressure determined therefrom. One hundred and eight patients altogether were examined. They were affected with the different varieties of cataract, as follows:—99 senile, 3 complicated, 3 diabetic, and 3 with albuminuria.

The authors find that increased blood pressure is exceptional in cataract patients. In the 99 cases of senile cataract there were 80 in which the blood pressure was below 140 m.m. Hg. In 8 the blood pressure was high, though not exceeding 150 m.m., and the remaining 9 were classed as very high. It is interesting to note that these figures are lower than those found by Frenkel in glaucoma, and much below those found by Méo in the 13 cases of arterio-sclerosis examined by him, in which the lowest pressure recorded was 177 m.m. Hg., and the highest 231 m.m. Hg. Senile cataract then is not regularly accompanied by arterio-sclerosis.

An examination of the figures given by the authors shows that neither sex nor age have any appreciable influence on the blood pressure. The mean tension in men between 60 and 70 years was 130 m.m. Hg., that of women for the same decade 126 m.m. of Hg. In cataracts, at the age of 80 there were 2 with very high tension, 160 and 161 m.m. Hg., 5 normal, and 1 very low. Of the complicated cataracts examined 2 (albuminuria and malignant myopia) showed weak tensions, below 120 m.m. Hg.; 2 (atrophy of the optic nerve, and a case of diabetes) were normal, below 140 m.m. Hg.; 5 were very high, above 160 m.m. Hg.; of these 5, 2 were complicated by albuminuria, 2 had diabetes, and 1 had a retinitis, the nature

and origin of which were undiscoverable. The mean general tension in this case was 194 m.m. Hg.

The authors conclude that in complicated cataracts weak or normal tensions are found in those cases in which the eye affection is purely local, and not following in consequence of a general malady. Very high tensions were recorded in those cases of eye affection which followed as a complication of some general disease, such as diabetes or Bright's disease.

In a previous paper Frenkel has shown that in cataract patients the kidney does not eliminate in the usual way the toxic products (crystalline cyto-toxins) elaborated by the organism. The output of urea is markedly diminished, and the chlorides increased. This type of renal insufficiency is unaccompanied by the usual clinical manifestations of kidney trouble, nor has it any appreciable effect on the general circulation, as the present work would show.

This research of Frenkel and Garipuy is not without a practical bearing upon such questions as intra-ocular hæmorrhage following extraction.

The authors divide post-operative hæmorrhages into those of the anterior, and those of the posterior segment of the eye. In the 4 cases in which such hæmorrhages occurred 3 were in patients with increased blood pressure. In 42 patients with normal blood pressure operated on there was only 1 in which an anterior segment hæmorrhage occurred, while in 10 with very high blood pressure there were 3 who had intra-ocular hæmorrhage. In 1 the hæmorrhage was expulsive. The influence of increased blood pressure in the production of these hæmorrhages therefore seems manifest.

In all the cases of hæmorrhage occurring in the anterior segment there had been a previous iridectomy (the hæmorrhage occurred in three cases on the 4th, 5th and 19th days after the operation, and in 3 out of the 4 recorded cases there was loss of vitreous, circumstances which, to the reviewer's mind, slightly modify the deductions arrived at.

It is stated, however, that increased blood pressure is not the sole factor; there are other causes which determine an effusion of blood, as in the case of cerebral hæmorrhage. Possibly the arterial walls are already diseased. Fortunately the diseased states in which there is a predisposition to these formidable post-operative accidents are very few. It is a matter of common experience that purgatives sensibly lower the general blood pressure; and the authors, in conclusion,

recommend their administration in those cases in which it is necessary to operate irrespective of the sphygmometer indicating a gradual rise in the blood pressure. By so doing it is often possible to prevent the occurrence of post-operative hæmorrhages, which occur sometimes to compromise what otherwise would have been a successful result.

The work is commendable, though still leaving us in ignorance as to the actual cause of senile cataract. In the first table, giving the maximum and minimum tensions in 55 male patients, maxima and minima ought to be reversed.

J. BURDON-COOPER.

SCRINI and FORTIN. Central Scotoma in Congenital Amblyopia and its Relation to Parturition. *Archives d'Ophthalmologie*, November, 1906.

DONDERS did a great service to ophthalmology in drawing attention to the relationship between squint and errors of refraction. There can be little doubt, however, that his work has had the effect of diverting attention from other factors in the causation of congenital squint and amblyopia. In the past the expression "amblyopia ex anopsia" has covered a multitude of inexplicable conditions, and has soothed the mind that is not hypercritical. We welcome this paper by Scrini and Fortin as a bold effort to place the pathology of congenital squint and amblyopia on a sound scientific basis.

Congenital amblyopia is characterised by the absence of diplopia and of precise fixation and by a considerable diminution of visual acuity. It has been observed by many—including Fano, Abadie, Landolt, Straub, Ole Bull, Javal and others—that this defective vision is generally confined to the macular region. The presence of a central scotoma prevents the eye from fixing a small object precisely, and the absence of fixation in an eye is presumptive evidence of the presence of a central scotoma. The scotoma is generally relative, but may be absolute; it is often very small (3° to 15°), and may be round, oval or irregular in shape. It is generally situated about 12° from the blind spot. The deficiency of vision is not regulated by the extent of the scotoma, and a scotoma of 4° — 5° may lower visual acuity to $\frac{1}{15}$ th whilst a vision of $\frac{1}{4}$ may be retained where the scotoma is very extensive.

A clear demonstration of the presence of central scotoma in an amblyopic eye has been a difficult matter owing to the absence of fixation in the affected eye. This has now been overcome by means of the stereoscopic cards of Haitz and by the method of Schlösser and Hirschberger. The former represent concentric geometrical figures, in silver-grey on a dark ground, which are in great part superposable to facilitate fusion of the images. In congenital amblyopia fusion occurs in all but the central parts, which are invisible in that part of the field of the bad eye which corresponds to the scotoma.

In the Schlösser-Hirschberger method the sound eye is made use of for the purpose of fixation. The sound eye is covered with a red glass, and fixes the green central point of the perimeter, which will appear black. A green object is placed on the carrier of the perimeter. The amblyopic eye, being uncovered, sees the green of the moving object, and if at any point of the arc the eye ceases to see the green clearly, there is in the corresponding region a relative or absolute scotoma for green. The examination must be repeated for each fundamental colour. Another procedure requiring the use of the amblyopic eye only and demanding only a relative fixation is as follows:—A small object, such as a pin-head, is moved round a white spot on a black ground. The amblyopic eye follows the movements of the pin, and if the white spot always disappears when the eye is in a certain position we assume that there is a central scotoma at that spot.

Very often patients will spontaneously state that they do not see an object if they look straight at it, but can see it if they look above it or a little to one side. Heine has shown that a central scotoma was present in 90 out of 100 cases of congenital amblyopia, where the vision varied from $\frac{1}{2}$ to less than $\frac{1}{20}$ th. Scrini and Fortin found central scotoma in 15 out of 16 cases where vision was reduced below $\frac{1}{10}$ th.

There is strong presumptive evidence that the central scotoma in these cases is related to central retinal hæmorrhages at birth. Such hæmorrhages at the posterior pole of the eye have been observed by Königstein in 25 out of 281 cases, by Bjerrum in 2 out of 63 cases, and by Schleich in 49 out of 150 cases. Naumoff showed that these hæmorrhages were related to the duration, difficulty and complications of labour and delivery. They were never seen in the eyes of infants born prematurely, but were common in prolonged and difficult labour, especially

when the circulation of blood in the head had been obstructed or forceps had been used.

This view is supported by the experience of Scrini, who also found that concomitant convergent squint is more frequently found among the children of primiparæ than among those of multiparæ, and that the number of cases of strabismus is closely related to the duration and difficulty of labour and delivery.

J. JAMESON EVANS.

POYNTON, PARSONS, HOLMES. A Contribution to the Study of Amaurotic Family Idiocy. *Brain*. Vol. xxix., No. 114.

THE number of cases of this disease in which microscopical examination has been made is limited. The writers of the paper before us have found record of eleven, but of this number several are of little value in consequence of the incompleteness of the examination. Poynton and his colleagues have added two cases to the list, and have given the records of a very thorough microscopical examination of the central nervous system. The changes described by them are in essential agreement with those reported in some of the previously published cases, such as those of Spiller, Kingdon and Russell, and one of Sachs' cases.

The histological changes, which are found throughout the whole central nervous system and which affect chiefly the nerve cells, cannot be adequately described in an abstract. They have been observed in so large a proportion of the cases that it is justifiable to regard them as typical of the disease. They are well shown in the illustrations in Poynton's paper.

The following is a *resumé* of the conclusions to which Poynton, Parsons and Holmes have been led by examination of their two cases and by a comparison of their findings with those of previous writers:—

The characteristic changes in the nerve cells and the relatively little affection of the nerve fibres are so unlike the morbid anatomy of any other known condition that it is natural to consider amaurotic family idiocy a disease *sui generis*.

There is strong evidence that it is a *primary disease of the nervous elements*. These are affected not only throughout the whole central nervous system, but also in the dorsal root ganglia and in the retina. All the evidence tends to prove that the neuroglia is not primarily affected, but that its proliferation

follows the degeneration of the nervous elements. There is no evidence that the changes in the nervous elements result from disease of blood-vessels.

The nerve cells are relatively more affected than the fibres. In many systems, as the direct cerebellar tract, the dorsal and ventral spinal roots and the optic system, there may be no visible change in the fibres, although the cells from which they spring are greatly altered. This fact shows that the affection is, primarily, a cell disease.

Elective staining of nerve cells shows that the interfibrillar protoplasm is more severely affected than are the neurofibrils, and hence the *primary* change is probably *disease of the interfibrillar protoplasm*, the alterations in the neurofibrils being secondary to this.

As to the etiology of the disease, the authors conclude that: (1) It is not due to arrested development; (2) it is not due to bacterial toxins; (3) it is due to some inherent bio-chemical property of the *protoplasm of the cells*, as a result of which it undergoes certain changes which lead to its degeneration, and consecutively to degeneration of the parts of the neurone (neurofibrils, axis cylinders and myelin sheaths), the normal existence of which is dependent upon it.

J. B. L.

CASSIMATIS. Injury to the Eye caused by Pure Corrosive Sublimate. *Archives d'Ophthalmologie*, October, 1906.

THE patient, a man of about 30, had, through an inadvertence on the part of a chemist, pure corrosive sublimate instead of calomel instilled into his eye. He was seen by Cassimatis six hours after the accident. There was great restlessness and severe pain in the eye. The lids and side of the face were enormously swollen, and the skin red and tender. The pre-auricular and sub-maxillary glands were enlarged, and there was intense chemosis. The cornea was greyish-white, the pupil was contracted and there were symptoms (cold clammy sweat, feeble pulse, fetor of the breath, colic) indicating a general intoxication. Atropine, cocaine and iodoform ointment were ordered, a moist dressing applied, and stimulants administered.

The subsequent history of the case was as follows:—A yellow infiltrate appeared in the cornea which gradually extended, severe iritis developed, and the pupil became filled

with a membranous exudate. Secondary glaucoma followed, for which, after consultation, eserine was ordered. This not only had an unfavourable influence on the tension, but increased the pain, and it was discontinued. The cornea perforated, and a corneal fistula resulted, which closed at the end of four days. The tension again became high, +2. Pilocarpin was instilled, and a violent glaucoma set in, for which it was decided to do a "paracentesis" (the patient objecting to iridectomy). Paracentesis was performed on three separate occasions for the relief of tension and pain. The tension again became very high, +4, and iridectomy was insisted upon; but, owing to a faulty placing of the incision, the friability of the iris, and dense adhesions, it was impossible to excise even a small portion of the iris; so that at the end of the operation the tension was still +3. Leeches were applied, and posterior sclerotomy performed. The tension fell to +1, and the eye gradually quieted down. The tension became normal, there was a dense vascularised leucoma, and an insignificant symblepharon in the inferior cul-de-sac.

The termination was as favourable as could be expected, the form and volume of the eye being preserved with perception of light. The interest of the case lies in the development of symptoms indicating a general intoxication, caused by the absorption of a quantity of corrosive sublimate by the conjunctival vessels, and as such is extremely rare.

In his remarks on the case the author describes the different degrees of lesions produced by corrosives in general (according to Willard), and the morbid histology of the cornea and membranes of the eye which result from the absorption of corrosive sublimate solutions. That myotics should raise the tension in secondary glaucoma and generally aggravate the condition, is not an unknown clinical observation, and the usual explanation which the author gives (dragging on the iris, congestion, increased transudation without freeing of the filtration angle) is perhaps the best put forward to explain it.

J. BURDON-COOPER.

CHARLES LAFON (Bordeaux). **Histological Study of Spring Catarrh (Tarsal Variety).** *Annales d'Oculistique*, October, 1906.

CLINICALLY, the case from which Lafon got the material upon which he bases this paper was only peculiar in the age

at which the disease appeared, viz., 35 years. Cases do not usually begin after 25 years. The vegetations were strictly limited to the upper tarsal plates, the cul-de-sacs being free. On section the growths showed a fibrous framework covered by varying degrees of epithelial layers of different types. Neighbouring vegetations were separated from each other by dipping down of the epithelium, and there were many different kinds of epithelial insets into the stroma—from a simple pavement-celled dip to a long infundibuliform fissure lined with cubical or cylindrical cells. The fibrous framework was chiefly derived from the tarsus, though its periphery received some differently staining fibres from the conjunctiva, the latter giving the signs of a hyaline degeneration. Different kinds of cells were found, chiefly occupying the central portions of the vegetations, in places forming masses of adenoid tissue round the vessels, which were few and small. Eosinophilous cells—mono- or poly-nuclear—were found abundantly.

Whether these vegetations are primarily derived from the conjunctiva or the tarsus has long been a matter of dispute; but Lafon agrees with Schieck, who has proved elsewhere that the fibrous tufts arise from the superficial layers of the tarsus and push the conjunctiva before them, becoming infiltrated with the cellular elements of the distended mucous membrane. The vitreous (glassig) degeneration of the subepithelial fibres of the tufts, as described by Schieck, was not found by Lafon; but a hyaline degeneration was present.

One most important point brought out by Lafon was that throughout the whole thickness of the vegetations there were many eosinophilous cells present. Now this local increase of eosinophilous cells (the leucocytic formula of the blood was normal) is found to occur in cases of adenoids, enlarged tonsils and hypertrophied turbinates, but not in cases such as papillomata or epitheliomata of the conjunctiva. Consequently Lafon argues that there is a great analogy between adenoids, etc., and spring catarrh, the position of the disease accounting for the variety found in the growth; and he would suggest for the affection the name "proliferating tarso-conjunctivitis."

FRANK C. CRAWLEY.

LAGRANGE and VALUDE. *Encyclopédie Française d'Ophtalmologie*. Vol. v. Paris: Octave Doin.

THE fifth volume of this fine work—which, by the way, is worthy of a place beside the new Graefe und Sæmisch—extends

to 1,152 pages. The subjects treated of are: Glaucoma, by Gama Pinto; Diseases of the Eyelids, by Terson; Affections of the Conjunctiva and Cornea, by Morax; and of the Sclerotic, by Rohmer; Lagrange being responsible for the sections dealing with Tumour of the Lids, Conjunctiva and Cornea. We have nothing but praise for the manner in which these well-known authors have accomplished the tasks allotted to them. Their work is in each case characterised by clearness of style and thoroughness, without undue prolixity. An excellent bibliography is appended to each section, the list of references to articles on glaucoma alone occupying 50 pages.

The terms employed in the chapters on Sympathetic Affections are apt to create confusion in the minds of English readers. The word sympathising is used in an active sense to indicate the eye which sets up or excites sympathy, in contra-distinction to the passive meaning which it possesses in our language, where the sympathising eye is that in which sympathy is excited. A similar application of terms is found in German. The exciting eye is known as the "sympathisant" (French) or "sympathisierend" (German), while the eye which we call the sympathising one is said to be "sympathisé" or "sympathisiert." To put it simply, the French and German writers speak of the exciting eye as the "sympathising" one, and the eye in which sympathy is excited (our sympathising eye) as the "sympathised" eye.

The description of the different forms of conjunctivitis by Morax possesses much clinical as well as scientific interest. The relation between the bacteriological and clinical aspects of these diseases is, as one would expect, discussed in a very full and masterly fashion. We are pleased to note that the author places more reliance, in the treatment of conjunctivitis, on the nitrate than on the organic combinations of silver. He finds it especially beneficial in acute contagious conjunctivitis due to the Weeks' bacillus, in which, on the other hand, mercurial lotions are of little service, except of course as an aseptic cleansing lotion, for which purpose a sterilised saline solution is equally good or even better. As regards angular or diplobacillary conjunctivitis, he considers that the sulphate of zinc solutions should be much stronger than those which are commonly prescribed. As much as ten grains to the ounce may be necessary in order to obtain a perfect cure. Morax does not consider it necessary to use any protective covering for the sound eye in the purulent ophthalmia of adults. This has been

the practice of the reviewer, and he has never had any trouble in consequence.

The tendency to atropine conjunctivitis or infiltration, according to Morax, is diminished by the use of oily collyria, but is not always prevented by them.

We noticed a few small errors due to inadvertence. For instance, on page 1,088 the heading "Tumeurs vraies de la Cornée" should refer to the sclerotic and not to the cornea. Again, on page 684, "Swanzy and Veasy" should read de Schweinitz and Veasy.

GEORGE T. STEVENS (New York). **Motor Apparatus of the Eye.** Octavo, 510 pages; 184 illustrations. Philadelphia: F. A. Davis Company, 1906.

IN the last twenty years Dr. Stevens' writings have had an important influence on the teaching and practice as to disorders of the ocular movements. This volume sets forth clearly and consecutively the important facts regarding the subject, as they are viewed from Dr. Stevens' standpoint. One can scarcely appreciate the thought and labour that he has bestowed upon this subject, or properly estimate his views, or his contributions to our knowledge of it, without a careful examination of this work. Several sections of the book have previously appeared in the form of journal articles, and little that is wholly new is here advanced. But the broad foundation for its author's peculiar views regarding the motor anomalies of the eye is worthy of careful study, even from those who regard his conclusions as not well-founded.

The body of the work is divided into four parts, preceded by an historical introduction. Part I. takes up the anatomy of the motor muscles of the eyes and parts accessory to them. Part II. deals with the physiology, not only of the movements, but also of visual perception of space, perspective, unconscious conclusions, corresponding points, the horopter, etc., etc. Part III. is devoted to anomalous conditions of the motor muscles of the eyes "consistent with the physiological state," as concomitant squint, heterophoria and related topics. Part IV. considers anomalous conditions of the motor apparatus of the eyes "not consistent with the physiological state," as paralysis, spasm and arrested development of the ocular muscles.

Dr. Stevens has proposed many new terms relating to the

ocular movements, some of which have been generally adopted. A few which we have not previously met with are used in this book. Among these are colytopia, a hindrance or obstruction to the movement of the eyes, from the Greek κωλύειν to hinder, to prevent; plagiotropia, from πλάγιος, slanting; and talantropia, from τάλαντωσις, an oscillating. This latter term is used to designate involuntary oscillations of the eyeball not depending on cortical lesions, hitherto classed under nystagnus.

Dr. Stevens' work cannot be regarded as a careful summary of the knowledge and views of the profession at the present day regarding the motor apparatus of the eyes. It has too much of the character of special pleading, lays emphasis on what supports its author's views, and neglects what does not fit smoothly with them. But it is worth while for any ophthalmic surgeon who wishes to gain a full understanding of the subject, carefully to consider it from Dr. Stevens' standpoint.

E. J.

M. D. STEVENSON (Akron, Ohio, U.S.A.). **Photoscapy (Retinoscopy)**. Philadelphia and London: W. B. Saunders Company, 1906.

JAMES THORINGTON (Philadelphia, U.S.A.). **Retinoscopy**. (5th edition). London: Rebman Ltd., 1906.

WE have received copies of these two treatises upon this valuable, or rather invaluable, and indeed indispensable, method of testing refraction. That of Stevenson is a book of rather over one hundred pages, written by an author evidently very familiar with the procedure as he employs it. He prefers the term photoscapy to any of those in more common use, but when a name has become thoroughly embedded in the language is there any special gain in endeavouring to substitute for it another, and unfamiliar, term, even if it be a trifle more precise? We consider that the author has rather spoiled a good and practical treatise by making it too long and by somewhat overloading it with unnecessary matter, and with really useless and sometimes questionable directions and rules. Dozens of paragraphs are numbered "1," "2," etc., and filled out with exceptions which do not occur and advice which is not required. Thus (page 52):—

"1. The room must be darkened.

"2. The patient and examiner are to be seated facing one another at a distance of 1 or $\frac{1}{2}$ metre, with their eyes and the light on the same level. However, no arbitrary rule governs this distance between patient and observer. The examiner may choose the particular distance he prefers in each individual case."

If the last clause is true the first part of the second rule need not be laid down so absolutely. Then follow 3, 4, and 5; next we have: "6. Correcting lenses should be worn if they improve the examiner's vision, which should be at least $\frac{6}{6}$ for good work," etc. But if the test is conducted at a distance of 1 or $\frac{1}{2}$ metre, surely good vision at *that* distance is needed rather than at 6 m.

There are no fewer than 14 labelled and numbered paragraphs like this before one comes to the point. They could all have been better expressed in as many lines.

We notice one piece of advice which he gives of which the reviewer strongly approves, and which he has always urged upon pupils, namely, to use spherical lenses even in testing astigmatic patients. While apparently considering that correct retinoscopy is impossible without the use of a cycloplegic, Stevenson makes a true remark, but one not universally recognised as such, when he says that complete dilatation of the pupil is a source of annoyance to the observer, as it gives confusing reflexes from the peripheral areas of the pupil which are not of importance in the refraction of the central area.

Thorington's is a shorter and much less diffuse book, the numerous diagrams in which are greatly superior to those in Stevenson's and more instructive than they. The following passage on p. 57 has caused some entertainment to the reviewer: "Cases of myopia and mixed astigmatism which have large pupils *can* be quickly and accurately refracted by the shadow test without the use of a cycloplegic. This has been repeatedly proven by comparison of the manifest and cycloplegic results; yet it is not a method to be recommended or pursued, for two reasons: One is that these patients are not annoyed, like hyperopsics, by the blurred near-vision incident to the cycloplegic; and, secondly, glasses ordered without the cycloplegic seldom give the comfort that follows from the physiologic rest the eye receives from the drug." The reviewer is entertained by the statement because he is in the constant custom of using retinoscopy without a mydriatic in all classes of cases (except

where special circumstances demand the use of a cycloplegic), and because, from his experience of this plan, he is sure that if those surgeons who constantly dilate the pupils would try it they would be themselves astonished at its accuracy—an accuracy which has in multitudes of both young and adult patients enabled him to settle the refraction down even to eighths of a dioptré, and that when astigmatism is present. As the method, too, enables one to dispense with a second visit of the patient and avoids the annoyance caused by the cycloplegia it saves much time to both persons and is highly appreciated by the patient. The test must, however, be applied in a manner different from that employed by the authors of both books.

These gentlemen both work at a short distance—usually 1 metre—and use a concave mirror. They both employ a method, too, in which the reviewer can see no advantage; they arrange the light, namely, upon a movable bracket, and bring it close to the observer's eye. The special benefit of this plan is satisfactorily explained and convincingly advocated by neither author. The one-metre distance position has this grave defect, in the opinion of the reviewer, that it necessitates the rule-of-thumb addition of a -1 D lens to the result obtained by the shadow test. Those rule-of-thumb methods detract greatly from the scientific accuracy aimed at in the primary procedure.

CLINICAL NOTES.

BACTERIOLOGY OF THE CONJUNCTIVAL SAC IN TYPHOID FEVER AND PNEUMONIA.—Randolph (Baltimore, U.S.A.) examined the bacteriological condition of the conjunctiva in a series of cases of typhoid fever, and was struck by the fact that this differs little, if at all, from the condition in health, and the same is true in cases of lobar pneumonia. This is the more striking that conjunctivitis is common in cases of enteric and not uncommon in pneumonia. The results he considers to point to the possibility that "the exposed mucous surfaces throughout the body are inhabited by bacteria which perform for their resting places functions of a protective character by making the surroundings uncongenial to bacteria of other kinds." As an illustration he points to Doederlein's vaginal bacillus, which is believed to play an important part in keeping that region sterile so far as pathogenic bacteria are concerned.—*Johns Hopkins Hospital Bulletin*, October, 1906.

OPTICO-CILIARY NEURECTOMY.—In India and in certain other countries it is sometimes a matter of much greater difficulty to induce a patient to part with even an admittedly useless and painful eye, and in such circumstances Major Elliot, I.M.S., recommends optico-ciliary neurectomy. The operation is far from easy of performance, and, under the influence of Golowin, he had been in the custom of using the external route, but finds now that the difficulties are reduced by the adoption of the older route *viâ* the inner side of the eye. The two great difficulties are to catch the nerve and to deal with the hæmorrhage, which is often very considerable. For the avoidance of the first difficulty he has devised a peculiar hook with a double curve, the whole being bent laterally in a form adapting it to the rotundity of the normal eye, and the tip being turned back upon itself 4 m.m. in the plane of the main curve. It is not easy to describe, but Elliot's drawings make the matter clear. After the division of the internal rectus the hook is slipped alongside the globe and made to hitch upon the nerve; scissors curved on the flat are then passed along the convexity of the hook and the nerve divided on the proximal side. By means of the hook the globe can now be rotated till the stump of nerve is visible, which is then cut short off close to the sclera. The hæmorrhage, by any method of operation, is apt to be very great; it does not seem possible to avoid this.—*Indian Medical Gazette*, November, 1906.

THE DECUSSATION OF FIBRES AT THE CHIASMA.—At a meeting of the Ophthalmological Society of Lower Saxony, Lange exhibited a microscopical specimen, being a section through the chiasma in a foetus of nine weeks. This showed in an unmistakable manner the semi-decussation of the optic nerve fibres; both crossed and uncrossed bundles are perfectly clearly visible.—*Klinische Monatsblätter für Augenheilkunde*, October, 1906.

AN ELECTRIC HEATER FOR THE EYE.—Hoffmann describes a new form of electric heater, consisting of an asbestos plate of suitable form to fit the eye, insulated, and which can be enclosed in a clean washable linen cover. In the circuit is introduced a dark-blue resistance lamp by means of which the heat can be kept to the required standard. A few years ago Maddox introduced a different form of apparatus adapted for a similar purpose.—*Klinische Monatsblätter für Augenheilkunde*, October, 1906.

A CASE OF KRÖNLEIN'S OPERATION FOR ORBITAL SARCOMA.

By G. T. BIRDWOOD, M.A., M.D., Major, I.M.S.;
Civil Surgeon, Agra.

ILAHÍ BUKSH, aged 40, was admitted into the Ophthalmic Hospital, Agra, on August 16th, for a prominent tumour occupying the lower and outer part of the right orbital cavity. The history given was that about two years ago he began to get pain about the right eye, and the eyeball gradually seemed to become more prominent, till the present condition was reached.

Condition on Admission. A big tumour can be seen pushing the right eyeball forward. It occupies the lower and outer part of the right orbital cavity, causing marked proptosis. The globe is also pushed upwards and inwards. It has come so far forward that from above the white sclerotic of the upper and posterior convexity of the globe can be clearly seen. Below, the skin of the lower lid and the palpebral conjunctiva are stretched over the tumour. On the outer side the tumour bulges forward so that the skin over the outer lid is rendered tense. There is some chemosis below the globe, and two large vessels can be seen crossing the tumour. The cornea has vascular keratitis over its lower third, probably due to exposure from inability to close the lids. The patient is suffering much pain.

The patient can count fingers, but the fundus cannot be seen clearly; only a faint red reflex can be got. At first sight it seemed that enucleation would be inevitable. But on careful examination it could be seen that the globe was only pushed to one side and was not itself involved

in the growth. It was only suffering from the effects of pressure, and some degree of vision was still present. Large though the tumour was, it was decided to try and save the globe by doing Krönlein's operation. I was encouraged in this attempt by reading the records of cases published by Colonel Lukis (in 1904) and Major Maynard (in 1905) in the *Ophthalmic Review*.

Operation. An incision was made commencing on the temporal ridge, about $\frac{1}{2}$ inch above and $\frac{1}{2}$ inch behind the external angular process. It was carried forward round the convexity of the ridge to the centre of the zygoma, going down to the bone. The anterior edge of the skin incision was pulled a little forward, and the periosteum lining the external wall of the orbit was separated from the bone and pushed inward, and the elevator placed in the cavity to protect the periosteum and the globe. The external angular process was chiselled through at its base, and from this point a fine chisel was directed downwards and inwards towards the spheno-maxillary fissure, and the thin plate of bone chiselled through or split in this direction. The frontal process of the malar was then also chiselled through at its base and the small piece of triangular bone readily pressed outwards. The orbital periosteum was then slit with scissors, and an attempt made to enucleate the tumour from beneath the globe and lower lid. It was, however, too big and extended too deeply. The incision had therefore to be enlarged from its apex to the external canthus and for a slight distance across the conjunctiva. The tumour was found to extend deeply into the orbit, and it was enucleated with difficulty by the finger and a pair of blunt curved scissors held unopened. After removal of the tumour the piece of bone was replaced into its position, and the globe and surround-

ing tissues pressed gently back into the orbit, and the conjunctival and skin wounds closed with horsehair, a small drain of sterile gauze being left in at a corner. The tumour was the size of a small hen's egg.

Progress of the Case. The wound healed rapidly. There was a slight discharge for a few days. The chemosis of the lower lid lasted for five or six days, but yielded to incisions and pressure from small pads. The globe gradually fell into position. He was discharged on the 21st September, 1906. There was then no proptosis. There was some ptosis, but the power of movement of the upper lid, which was at first nil, was gradually returning. Vision was also rapidly improving, and he could recognise small articles. The corneal haziness due to exposure was clearing up.

The points which seem to me worth noting are—(1) that if there is any vision at all, and the globe is not involved, it is worth while attempting to remove a tumour from the orbit by this method; (2) the congestion of the globe (due to pressure) and the vascular infiltration of the cornea (due to exposure) which incline one to make a bad prognosis at first, improve rapidly on removal of the tumour; (3) that no harm whatever results from splitting the external canthus and cutting a portion of conjunctiva near, if more room is needed. The records of this operation show that it has been done forty-nine times, and I publish this case to add one more to the list, and to testify to its great value.

My thanks are due to Dr. C. M. De for helping in the operation, for taking notes and finding out the literature on the subject.

REVIEWS.

H. VON KRÜDENER (Riga). **On the Pathology of Choked Disc and the Effect of Trephining.** *Graefe's Archiv für Ophthalmologie*, lxxv.

KRÜDENER treats the subject of optic neuritis from the point of view of increased intra-cranial pressure, which he looks upon as the most important cause of choked disc. The matter is discussed with due regard to anatomy, pathology and clinical facts, but the paper is mainly based on five cases in which the operation of trephining was performed. They seem to us all the more interesting, because, with one exception only, the increase of intra-cranial pressure was due to causes other than tumours. In all the cases there were few or no symptoms beyond headache, vomiting, double optic neuritis and visual defects, central or hemianopic. In three patients the symptoms followed injuries to the head, not sufficient to cause fracture; in one they were the result of meningitis; and in another of hydrocephalus. Except in the case of meningitis signs of increased intra-cranial pressure were present, and during the operation the dura and cerebrum bulged into the opening made by the trephine and did not pulsate. After operation the neuritis subsided, with improvement of vision, although it was undertaken in a very late stage when the vision was extremely bad. In two cases (tumour and injury) the neuritis relapsed, and both terminated fatally. Even in the first twenty-four hours following the operation the author noticed a diminution in the vascular engorgement of the disc. The swelling, however, only began to subside on the second or third day, and took a few weeks to disappear. That trephining may have a beneficial effect even in inflammatory neuritis is probable, as shown by the case of meningitis in which no evident signs of increased pressure were present.

Krüdener believes that transitory attacks of increased pressure of an inflammatory or non-inflammatory nature (exclusive of tumour cases) occur within the cranium and that, when we know more about them, there will be a wider field for the operation. It is interesting to note that, in the case of hydrocephalus, the brain substance which protruded into the trephine opening shut off the intra-cranial cavity, so that no oozing took place into the dressings, whereas in the other cases they were saturated with fluid.

Lumbar puncture of the spinal canal was tried in cases of cerebral tumour, tubercular meningitis, and syphilis, without any effect as regards the optic neuritis, except perhaps in the last-mentioned instances. In the case of a tubercular child, exhibiting cerebellar symptoms, lumbar puncture having been performed twelve times without result, Krüdener opened the sheath of the optic nerve, after a preliminary resection of the outer orbital wall, but even then no improvement in the papillitis was obtained. It is noteworthy also that culture experiments with the fluid aspirated from the nerve sheath gave negative results.

Following on the clinical facts comes a description of the microscopic appearances of four optic nerves with choked disc, from cases respectively of cerebral and cerebellar tumour, echinococcus cyst and acute hydrocephalus. As a result of his examinations Krüdener arrives at the conclusion that although evidences of inflammation are often visible in the nerves and sheaths, etc., in cases of choked disc, the inflammation alone is not sufficient to produce it, but that the *sine quâ non* is increased intra-cranial pressure. The case of cerebral tumour furnished a remarkable proof of the correctness of this view, for the elimination of the increased pressure by the trephine led to the usual subsidence of the swollen disc in spite of the occurrence of a severe infective meningitis after the operation. The effect of pressure on the nerve sheath is well shown in the illustrations which accompany the paper, the elastic fibres being stretched and straightened out instead of being more or less wavy, as in the normal nerve.

In the remaining pages the author proceeds to elaborate the possible causes of increased intra-cranial pressure. The increase of pressure may be general, as in tumour, hydrocephalus, or when the foramen magnum is encroached upon, but it has also been shown that a localised intra-cranial pressure may give rise to swelling of the optic disc by direct or indirect compression of the cavernous sinus, and that symptoms of cerebral pressure, including choked disc, can arise without retention or increased secretion of cerebro-spinal fluid.

The explanation of the sudden temporary attacks of blindness which are so frequently associated with choked disc is to be found, according to the author, in a momentary disturbance of the cerebral circulation.

Leslie Paton (*Trans. Ophth. Soc.*, Vol. xxv., p. 129) finds this symptom most frequent in cerebellar tumours, and since it is in

these cases that the intra-ventricular pressure is at its highest, it is, he thinks, probable that it may be caused by pressure of the infundibulum on the chiasma, but he also admits that it may be due to interference with the blood supply of the occipital lobe.

The reviewer has recently had experience of the beneficial effect of relieving intra-cranial pressure by trephining, in a case of presumed abscess of the temporo-sphenoidal lobe due to otitis media. Although the dura and cerebral cortex bulged into the trephine opening and did not pulsate, a careful search failed to detect any pus. Nevertheless the result was most satisfactory. The operation was performed nine months ago, and the patient is now in perfect health, whereas previously she was apathetic, had no appetite, and suffered from severe and constant headache. The double optic neuritis has completely subsided, with a vision of $\frac{6}{12}$ and $\frac{6}{18}$.

L. W.

SANTUCCI (Turin). **The Relation of Sympathetic Ophthalmia to the Theory of the Cytotoxins.** A Preliminary Note. *Rivista Italiana di Ottalmologia*, September-October, 1906.

EHRLICH's side-chain theory of immunity has now been almost universally accepted by pathologists. Working from it and along somewhat similar lines to those which have been so successful in the elucidation of that theory, Ehrlich, the band of workers who are associated with him at Frankfurt, and many others, have proceeded to the investigation of a number of other problems. To none has more attention been paid than to this very subject of the cytotoxins, and it is not to be wondered that the theory has been applied to various branches of ophthalmology. We have already had Römer's splendid investigations in which he applied these methods to disprove the ciliary nerve theory of sympathetic ophthalmia (abstracted in this journal); and two years later Golovine published his experiments on cytotoxins and sympathetic ophthalmia (*Archives d'Ophthalmologie*, Feb., 1905; c.f. *Ophthalmic Review*, June, 1905). Nearly all the theories which have been accepted at one time or another have been devoted to the path by which an influence, variously described as an infective agent, a chemical agent, or an inflammatory process of external origin, passed from the injured to the other eye. Mackenzie, of Glasgow, first pro-

pounded the optic nerve theory, although also mentioning the circulation and the ciliary nerve channels. Santucci mentions briefly the supporters of the various theories, including the work of Professor Motais in 1904 on the venous channel, who showed that the blood of the two eyes may freely intermingle by the angular veins with their nasal anastomosis, and the ophthalmic veins by the cavernous, the circular and the transverse sinuses,—all without valves.

It is impossible to give here a detailed account of the theory of immunity, of hæmolysins, agglutinins, etc., but the reader may be referred to the excellent summary of the whole subject in the third volume of Parsons' "Pathology of the Eye," which has just been published. Cytotoxins are poisons which act upon the cells of the tissues, while hæmolysins act on the elements of the blood. The former are divided into autocyto toxins, which, given certain conditions, are toxic for the animal in which they originate; isocyto toxins which are produced when the tissues of an animal are injected into another animal of the same species, and heterocyto toxins when into an animal of a different species. The serum of the inoculated animal is then toxic for the same tissue in any animal of its own species in the former case, or of the first species in the last case. Metchnikoff, his pupils, and others have carried out a large amount of work in this subject. Neurotoxic serum, hepatotoxic serum, and serum toxic to kidney substance, thyroid, pituitary body, etc., have been described. It has been found that toxic sera are more easily obtained in the case of animals of different species than for animals of the same species, and autocyto toxins are most difficult to produce.

Santucci carried out three series of experiments with rabbits and guinea-pigs. The first two were directed to a research on the isocyto toxins. While Golovine, of whose work Santucci does not seem to be aware, simply employed the iris and the ciliary body, the latter used an emulsion of the entire healthy eye. In the first series this was injected under the skin, and under the conjunctiva of other animals of the same species. In the case of the rabbit a moderate corneo-iridocyclitis followed the third subcutaneous injection. The inflammation subsided in ten days, and the eye returned to the normal. A further injection was succeeded by an "intense iritis" in the other eye, which had not previously shown any alteration. The subconjunctival injections were without result; and both were

unsuccessful in the guinea-pig. In the second series of experiments, in which the emulsion of the healthy eye was inoculated under the skin of one animal, after which the blood serum of the same animal was injected into another of the same species from which the healthy eye came, no results were obtained.

The experiments in the third series were similar to the first, but an eye which, after a severe injury, had approached the condition of phthisis bulbi, was employed for the emulsion. The sub-conjunctival inoculation was followed after four days by an "intense iritis," which healed without treatment, while the sub-conjunctival inoculation of the healthy eye emulsion was without result. All these experiments had been preceded by a large number of others to obtain definite data as to the receptivity of the different animals, the period between the different inoculations, and the quantity of emulsion necessary for inoculation; and Santucci ascribes his failures to errors in the various data which he had assumed. He claims that, while the results are incomplete, they do prove something, but had he obtained a long series of positive results he could have affirmed that sympathetic ophthalmia is due to autocytotoxins. The author, however, does not give any very definite account of his first series, and there is no pathological examination mentioned of the eyes with corneo-iridocyclitis or the "intense iritis." With regard to the third series of experiments, it is perfectly natural to expect an "intense iritis" after the sub-conjunctival injection of an emulsion of a diseased eye. We are not told whether the emulsion had been filtered or otherwise treated to exclude the etiological factors which produced the inflammation of the injured eye prior to the condition of phthisis bulbi. As the author says, his experiments are not complete, and we must await further research before coming to a final conclusion. The prospect is so fascinating that workers are bound to be attracted to this branch of ophthalmology. The process of reasoning is so logical that, given the necessary proof of the relationship of sympathetic ophthalmia to certain specific eye cytotoxins, or cyclotoxins, as Golovine proposes to call them, it is merely a question of time until the discovery of the anti-body similar to the anti-hæmotoxin of Ehrlich and the anti-spermatotoxin of Metchnikoff and Metalnikoff.

W. B. INGLIS POLLOCK.

L. SONDER (BORDEAUX). **Glaucoma produced by Emotional Excitement.** *Archives d'Ophthalmologie*, September, 1906.

IN this article the writer insists on the importance of the emotions in provoking an attack of glaucoma. He considers that though no one denies this influence, some are ignorant of it, and others do not pay it sufficient attention. He therefore brings forward many interesting cases to prove that emotional disturbances are a considerable factor in the production of increased intra-ocular tension.

Demours, in 1821, said: "It often appears to me that such a person affected with glaucoma would only have had an amaurosis if her nervous system had been less irritable."

Two of his cases bear out this view:—

In the first, a servant girl, aged 25, strong and of good constitution, was beaten about the body with a bottle by a drunken man, the eyes themselves being untouched. Glaucoma, however, immediately appeared in both eyes as a result.

In the second case, a man of 45, of good constitution, fell off his horse, and was at once attacked with glaucoma of the left eye, followed later by a similar condition of the right.

Donders, Hippel and Grunhagen recognised the emotional origin of glaucoma, and propounded a theory to the effect that the secretory nerves of the eye were stimulated by the excitement, and caused an excessive amount of intra-ocular secretion which the excretory channels were not large enough to carry off. Edouard Meyer and v. Graefe both believed in this cause, though the latter considered that it only operated in patients already specially prone to the disease.

De Wecker explained the method of its production as follows: The emotion excites the sympathetic, causing vaso-dilatation and consequent intra-ocular engorgement leading to increased pressure. He cites a case of an old lady of 60, who was addicted to gambling. One eye had already been lost through glaucoma, and she was forbidden to indulge in her favourite pastime. She carried out this advice for some time, but yielding one day to temptation, lost heavily at cards, and on the same night was seized with an acute attack in the sound eye, resulting in blindness.

Another example was that of a native of Paris, aged 56, who during the siege, quitted the city in a balloon, but fell into the hands of the enemy, and immediately had an attack of glaucoma in both eyes.

The last case he records was that of a lady who had developed a tendency to kleptomania. Caught one day in pilfering from a shop an article of small value, she was arrested and imprisoned, and glaucoma set in at once in both eyes.

Masselon held similar views to de Wecker. He says: "A congestion of the eye vessels, the emotion which suffuses the face and eyes, may be sufficient, by the swelling of the ciliary processes, to determine the upset of equilibrium."

Brun, Morax and Terrien all insist on glaucomatous patients avoiding as much as possible all emotional disturbances.

Mactier relates the case of a patient suffering from chronic glaucoma, who fell into the water and was nearly drowned. As a result of this accident he developed an acute attack and became blind.

Trousseau also gives instances:—

1. A lady of 60, who had had no previous eye affection, on being catheterised, an operation which she looked forward to with considerable alarm, was attacked with acute glaucoma.

2. A man of 58, having had prodromal symptoms of the disease for a year, fell from a boat into the water, and on being rescued complained that he was blind. He was found to have double sub-acute glaucoma.

3. A lady, aged 53, was operated upon for chalazion, and displayed great agitation. The night of the operation she had violent pain in the eye, and on the morrow was found to have glaucoma in the left eye, which was quite blind; an iridectomy was performed, but the other eye, in spite of free intillation of pilocarpine, was attacked three hours later.

Any emotion, of whatever character and however slight, may provoke an attack.

Laqueur explains prodromal symptoms by the dilatation of the pupil caused by emotional disturbance.

Critchett reports a case of a young woman, aged 29, in perfect health, who had never had any prodromal symptoms, being affected with acute glaucoma on receiving the news of the death of her sister.

Of all emotions, that of anxiety attendant on a surgical operation is, according to Dr. Sonder, the most frequent forerunner of glaucoma; and he considers the onset of the disease in one eye after an iridectomy for glaucoma in the other to be due to the mental condition of the patient. Such operations as catheterisation, enucleation of the eye, incising a chalazion, removal of a foreign body from the cornea, tenotomy of the

recti and the extraction of cataract have frequently been followed by glaucoma.

The author quotes two cases, under his own observation, of patients quite healthy, with no suspicion of a tendency to glaucoma, who on the eve of an operation for cataract developed acute attacks of glaucoma. He admits that the emotions alone could not, in all probability, produce an attack in a perfectly normal eye, but insists on such disturbances being recognised as a definitive cause of the attack.

Drake Brockman collected 44 cases of glaucoma, in which four acute attacks were due to nervous causes, but only two cases of chronic glaucoma due to emotion were found in 61 patients.

Wicherkiewicz notes the frequent occurrence of hysteria in glaucomatous patients, and Sulzer classifies the causes in three groups, viz., circulatory, vascular and nervous.

How does this nervous influence act? Donders and others thought that it produced an irritation of the secretory nerves of the eye and excessive intra-ocular secretion. Others, as Wicherkiewicz, favour the opinion that the sudden dilatation of the pupil in times of emotion is the active factor. Weber says that there is a reflex action in such conditions causing congestion of the small eye-vessels and altered secretion.

The importance of this subject is, in Dr. Sonder's opinion, that one should specially guard all patients who have suffered from or who are known to have a tendency to glaucoma from all emotional excitement; and not only such patients, "but all other invalids," and principally those affected with cataract. One cannot help feeling doubtful of one's power to imbue such patients with that extraordinary equable temperament which will enable them to view all the vexations and vicissitudes of life with equanimity, or to avert those fortuitous accidents which fate may have in store for them. In fact we cannot control the various emotions of our patients, and the value of this article lies rather in the interest of the facts quoted than in the possibility of guarding against their dire results.

WILFRID ALLPORT.

GOURFEIN (Geneva). **Primary Tuberculosis of the Conjunctiva.**

Archives d'Ophthalmologie, September, 1906.

CONJUNCTIVAL tuberculosis is fortunately, as Dr. Gourfein points out, rare as a primary or secondary affection. In proof of this the following list of recorded cases is referred to:—

Eyre	found 1 case in	3,000 patients.
Hirschberg	„ 1 „	6,000 „
Bock	„ 1 „	10,000 „
Lagrange	„ 1 „	15,000 „
Milligan	„ 1 „	20,000 „
Mules	„ 1 „	33,000 „
And the Author	„ 3 „	49,000 „

According to Villard 140 to 150 cases in all have been published, and of these 80 or 90 only have been submitted to pathological proof of diagnosis.

Of the primary conjunctival lesion, Ayrand can only find 19 cases on record, but since this statement was published five other cases have been recorded. Dr. Gourfein adds to this list the two following cases from his own clinique:—

The first was a girl, aged 5 years, seen in February, 1895. Her family history was good; both her parents and grandparents were alive and well. One sister died at the age of 2 years, of cholera; another, aged 13, was quite healthy; but a third, aged 11 years, had several cicatrices on the right arm, the result of caries. The only previous illness she had suffered from was measles. She was a well-developed perfectly healthy child, with the exception that her left eye presented a slight swelling of the upper lid. On everting the lid a rather deep ulcer was seen, extending from 2 m.m. from the margin to the cul-de-sac. The edges of the ulcer were abrupt and irregular and covered with very fine granulations; the base was yellowish and blood-stained. The bulbar and lower lid conjunctiva was a little hyperæmic but not chemotic, and there was a small amount of blood-stained yellow muco-purulent secretion. No pain or photophobia were present, and only the slight swelling of the lid, with the presence of the secretion, drew the attention of the mother to the condition. The pre-auricular and sub-maxillary glands were slightly swollen, but no lesion of any other organ was found after careful examination. The temperature was normal. The child had previously been under treatment in May of the preceding year for acute conjunctivitis of both eyes, and it was thought that the condition of the left eye dated from this. The patient was seen daily from the 12th to the 20th of February. On the 14th the ulcer was treated with galvano-cautery, and this led to a strong reaction with profuse secretion. On February 20th the condition was worse, and on the 22nd the cautery was again applied with

similar results. Until February 25th the general condition was excellent, but on the 26th the child was not so well, refused nourishment, and had a furred tongue; in the evening the temperature rose to 39.3° . This attack was thought to be due to gastric disturbance, and the appropriate remedies were used with effect, so that on the following day the temperature was normal and the child seemed quite well. She continued so until March 2nd, when she became very ill and complained of headache. On the suspicion that meningitis had supervened, she was admitted into hospital, where she remained until June 1st. She then left much improved, but had to be again admitted on June 18th, and died on July 13th.

During these two periods as an in-patient the following notes were recorded:—

In the first period she presented the ordinary symptoms of a febrile gastric attack, with constipation, abdominal swelling, coated tongue and an evening temperature of 38.5° . But on April 30th the lungs showed the typical signs of tuberculosis, which signs remained fairly constant until May 6th.

During the second period the first appearance of cerebral symptoms occurred; she became irritable and restless, slept frequently and was very feeble. On July 7th general convulsions with loss of consciousness supervened, and the child became comatose, dying on July 13th.

Autopsy. Meninges a little hyperæmic. In the cerebellum a large tubercular mass, yellowish-grey and caseating, was found in each hemisphere, that in the right being situated anteriorly, that in the left (the larger mass) externally. The surrounding tissue was softened. In the cerebrum many varied-sized tubercular deposits were found, all hard and yellowish, in the right frontal convolution, right lenticular nucleus, right corpus striatum and also in the left corpus striatum. The tarsal plate of the left upper lid was eroded through by the ulcer.

Various inoculation experiments were performed with the secretion from the ulcer. An injection was made under the abdominal skin of a guinea-pig, which died after five weeks, and was found to be suffering from general tuberculosis. A portion of this animal's spleen was injected in the same position in a second guinea-pig, death following after twenty-nine days from general tuberculosis. These experiments were confirmed by further injections into animals by another independent pathologist.

The question now arose whether the conjunctival lesion was primary or secondary. Ayraud in his thesis on the subject averred that primary infection of the conjunctiva did occur, and relates 19 cases of the condition in patients quite free from any other clinical signs of tuberculosis. The record of the case here quoted appears to show that the disease of the conjunctiva was undoubtedly primary, for, as has been related, the lesion showed itself on May 21st, 1894, and not until April 30th, 1895, did any definite symptom of general tubercular infection appear. The complications which may occur are infection of the various membranes of the globe, leading frequently to its destruction, or death may occur from secondary deposits in other organs. The brain and meninges being so closely connected with the eye, one would expect infection of these parts to be a common occurrence, but no cases are recorded previously of cerebral and only two of meningeal infection; so that the author's case is the first recorded example of secondary cerebral deposits.

The second case, that of a girl, aged 12, was first seen on March 30th, 1895, with an affection of the left eye. This dated, according to the mother, from two years back. Her family history was perfectly good, and the child herself had been quite healthy with the exception of a rash when three months old, which was put down to vaccination. She had had recurring attacks during the two previous years of "redness of the eye" and glueing together of the lids in the morning, but no pain or discomfort. On examination the left upper lid was found to be swollen and thickened, and when everted the conjunctiva in the whole length of the cul-de-sac was covered with vegetations in the form of a cock's-comb, descending over the cornea like a fringe. The portion of the cornea covered by this fringe was vascularised. There was a little mucopurulent secretion, and the bulbar and inferior palpebral conjunctiva was hyperæmic. The pre-auricular glands were large but painless.

On April 2nd the vegetations were excised and their bases cauterised. After a considerable amount of reaction the patient left the hospital apparently cured in eight days. She returned, however, on May 6th with fresh vegetations, which were also excised and cauterised, and on the following day a solution of 2 per cent. silver nitrate was brushed over the raw area. On the 25th she left the hospital again. Until October, 1896, she had no return of the trouble, but on that date once

more returned with a precisely similar condition, which was treated in the same manner as before, ending in three weeks' time in complete and lasting cure. Since then she has been frequently seen, and with the exception of occasional simple phlyctenular conjunctivitis of the right eye has been perfectly well.

As in the first case, inoculation was made into guinea-pigs in three separate series, producing in each case general tuberculosis and death in varying periods.

Of this rare form of conjunctivitis only 12 cases are recorded, and of these only five have been definitely proved to have been tuberculous.

Prognosis. The prognosis in such conditions is much more grave than is generally believed. Many cases of recovery are quoted, but few of them have been conclusively proved to be of tubercular origin. The tendency to complications renders the prognosis grave, though many considerations have to be taken into account, such as the early diagnosis, the virulence of the bacilli, the resistance of the patient, and, above all, the clinical form of the lesion. The ulcerative form is no doubt the most serious, as records prove. In fact in nearly every case where loss of the eye or death has ensued, the lesion has been ulcerative.

The conclusions which one may draw from these records are:

1. Conjunctival tuberculosis may lead to cerebral tuberculosis.
2. The prognosis of the ulcerative form is the most serious.
3. There may be long intervals between the attacks.
4. The condition is curable.

WILFRID ALLPORT.

FLEISCHER (Tübingen). **The Eye Lesions in Multiple Sclerosis.**
Die Ophthalmologische Klinik, x., 19.

THE most important affection of the optic nerve associated with multiple sclerosis is acute retro-bulbar neuritis. Formerly cases of this kind were frequently set down as rheumatic in character, but when their subsequent history was pursued and the symptomatology of multiple sclerosis became better known the relation between these two diseases was at length recognised. In 1904 Marcus Gunn gave at Oxford an analysis of 233 cases of primary retro-bulbar neuritis, and of these he found that 51, *i.e.*, 20 per cent., were due to multiple sclerosis. On the same occasion Uhthoff reported that out of 120 cases of this disease

about 8 per cent. were due to the same cause. These results have led Fleischer to analyse the cases in the clinic in Tübingen: cases of retro-bulbar neuritis, acute optic neuritis (papillitis), more chronic optic neuritis, post-neuritic and simple optic atrophy, choked disc, and hemianopsia where no definite etiological diagnosis had been made.

He found that of 24 cases of acute retro-bulbar neuritis, 6 were undoubtedly due to multiple sclerosis, while, taking into consideration certain facts gained about the subsequent history of the others, he was led to conclude that altogether no fewer than 16 were due to this disease. In 10 of these 16 cases the neuritis appeared at varying periods from shortly before up to ten years before other symptoms of multiple sclerosis, while in four they appeared simultaneously. The course of most of the cases followed the usual type, but in one the vision was reduced to counting fingers, and in another a ring scotoma was found; in 25 per cent. of the cases both eyes were affected. As to the age of these patients, 21 were between 17 and 34 years old.

Of 14 cases of acute papillitis where the onset and course resembled those of retro-ocular neuritis, Fleischer found three certainly, and other two probably, due to disseminated sclerosis; in other 8 atypical cases no such association could be traced. He observed that slight blurring of the margins of the disc and a certain opaque appearance of its surface are very frequently present in cases of multiple sclerosis, and when this opaque appearance of the disc is taken as a sign of post-neuritic atrophy the frequency of this atrophy is very great, viz., in 23 out of 39 recent cases.

In none of the cases of simple atrophy, choked disc or hemianopsia which he examined has he found any relation to multiple sclerosis.

THOS. SNOWBALL.

ONODI (Buda-Pesth). **Contra-lateral Defect of Vision in Disease of the Nose.** *Die Ophthalmologische Klinik*, x., 20.

In treating of the disturbances of vision and blindness on one side associated with nasal disease of the opposite side, Onodi enumerates ten different anatomical conditions observed with regard to the relation of the posterior ethmoidal cell and the sphenoidal sinus on one side to the optic canal on the other, and part or whole of the optic groove. He found from

anatomical examination that the cell and sinus just mentioned may, either together or separately, come in varying degrees into the formation of the opposite optic canal and the optic groove, and may therefore be separated from the opposite optic nerve and the chiasma by an extremely thin plate of bone. In discussing the various cases of this kind that have been recorded by other observers, Onodi fairly claims that these morphological variations offer a simpler and more satisfactory explanation than some of the fanciful hypotheses that they have put forward.

On the basis of this anatomical relationship he emphasises the fact, which he has already discussed in previous work, that the optic nerve and chiasma may become affected from disease in the accessory sinuses of the opposite side either by extension of the inflammation through physiological congenital defects in the bone (in the wall of the optic canal or accessory sinus, or along the canals for the ethmoidal veins), or through some disturbances in the circulation, such as œdema, hæmorrhage, exudation into the optic nerve sheath, thrombosis, etc.

But while he holds that the morphological conditions satisfactorily explain the question of cause and effect between disease of the posterior ethmoidal cell and sphenoidal sinus on one side and that of the opposite optic nerve or both nerves, he admits that such knowledge must be supplemented by accurate clinical observations as well as by post-mortem examinations wherever possible. He regrets, however, that so far post-mortem reports have been defective, as no microscopical examination of the optic nerves has ever been made, while work has still to be done with regard to the relation of these nerves to the diseased or healthy accessory sinuses, as well as the state of the ethmoidal veins, the central vein of the retina, and the veins of the affected accessory sinuses.

THOS. SNOWBALL.

S. HELLER (Vienna). Systematic Exercises of the Eye when Vision is Defective. *Die Ophthalmologische Klinik*, x., 20.

EXPERIENCE has convinced the author of the great value of systematic exercises for the eyes in cases where the vision is very considerably reduced. The amount of sight remaining can hardly be too small to preclude the possibility of improvement, even the power of distinguishing merely light and shade

may suffice. As there is no single method of procedure applicable to all cases alike lack of success at the beginning of one's experiments may merely be the result of employing exercises unsuitable to the case in hand. The main principle, however, lies in awakening the mind through the eye exercises in order that, by broadening the intelligence, the mental impressions and operations may in turn lead to an increase in the functional power of the eye. It is this co-operation of mind and eye that forms the kernel of the whole education of the "blind."

Systematic exercises are applicable after cataract operations on patients born blind, in cases of disease of the optic nerve and retina where a little vision is still left (*e.g.*, retinitis pigmentosa) and in cerebral amaurosis.

Heller illustrates his methods and results by the case of a girl, 14 years of age, whose vision when she came under his charge was reduced to counting fingers at one metre with either eye; the visual fields were very small, there was marked nystagmus, and, according to Prof. Schnabel, atrophy of the retina. All his efforts were at first attended with little or no results, but when he began to carry out his exercises in a well-illuminated field (with the rest of the room darkened) improvement became marked; the function of the eye increased, the patient could recognise simple objects like squares, circles, cubes and spheres more precisely, as well as localise and distinguish them with greater facility. Then, in order to carry out such simple exercises in ordinary daylight, it was at first necessary to bring the objects into strong contrast with their surroundings, *e.g.*, white objects on a black background. Not only were flat figures or objects of different shape used, but similar objects of different size were employed. (The principle of contrast was also utilised to convey the impression of differences in colour as well as in other ways.) As the patient became practised in recognising and distinguishing the characteristic points of forms or figures, of which the geometrical ones were the fundamental, she gradually acquired an increasing number of mental impressions of similar yet slightly different objects, and these again stimulated the power of observing variations of form.

A further stage consisted in instructing the patient to form a mental picture of some known object (without showing it to her), and then, after she was directed to make some change in it in her mind, to look for it in the latter form among several

objects set before her. From this she came to understand the relation of pictures to the real objects; and out of this grew the power of taking away or combining parts of objects or impressions, *e.g.*, the lines of geometrical figures to form the letters of the alphabet, and thus she was brought to read.

By making her follow with her eye the movements involved in such exercises as taking a picture off a hook or a spoon out of a cup and then reversing the action she learned to unite two points by lines and hence to write and draw.

The great success attending the instruction of this and other cases leads the author to wish that others may direct more attention to the class of weak-sighted patients for whom such exercises prove useful.

THOS. SNOWBALL.

HENRI FRENKEL (Toulouse). **On the Relationships between Inequality of the Pupil and Inequality of the Refraction.**
Annales d'Oculistique, October, 1906.

OPINIONS of authors vary as to the relationship between anisocoria and anisometropia. M. Frenkel gives a list of those who believe that there is a relationship between the two, and another of those who do not, and he adds some new researches of his own on the subject. As far as the published opinions go, it would seem that those who recognise a relationship between the two states are about equal in numbers to those who do not, though Frenkel is careful to point out that Heddaeus, Reche and himself are the only authors who have brought facts to help their opinions and do not merely rely on impressions. These three authors believe that there is no relationship between anisocoria and anisometropia.

Frenkel adds tables in support of his views; the first giving 25 cases of anisometropia with equal pupils; the second giving 10 cases of anisocoria with no irregularity of refraction; the third giving 10 cases of anisocoria combined with anisometropia. These last 10 cases are those found amongst 5000, and no correspondence was discovered between the size of the pupil and the degree of the ametropia. Sometimes the most ametropic eye had the larger pupil, and *vice versa*.

FRANK C. CRAWLEY.

A. STANFORD MORTON. **Refraction of the Eye.** Seventh edition. London: H. K. Lewis.

WE are very glad to see Mr. Morton's useful little book on Refraction maintaining its just claim to popularity by its appearance in the seventh edition. The only improvement of which the sixth edition was capable is found in the addition of a chapter on Prisms and their application, which subject Mr. Morton treats in his clear and concise way.

We strongly recommend the book to students, teachers and those general practitioners who think of adding a knowledge of refraction and the correction of its errors to their "stock-in-trade."

DOR (Lyons). **Prevention of Infection of the Eye by the Pre-Operative Administration of Potassium Iodide.** *L'Ophthalmologie Provinciale*, December, 1906.

FOLLOWING up his laboratory experiments on animals regarding the value of potassium iodide in preventing infections of the eye, an account of which was communicated to the Ophthalmological Congress of 1901, Dor further endorses the prophylactic value of this drug in post-operative eye infection in man. For the last five years he has given iodide of potassium previous to operating in doses of 15 grains thrice daily for three days before operation, and within this time he has operated on numerous complicated cases without the slightest accident. He relates the case of a double cataract in a man, aged 70, who had, in addition, purulent cystitis, prostatitis and perineal fistulæ. The right eye had been lost through operation. Dor gave his usual prophylactic and operated, with the patient just as he was on his bed, in a miserable garret, lighted only by means of a bull's-eye lamp, and in an atmosphere impregnated with the odour of decomposing urine. The result was good.

Assuming that Dor's results are confirmed by others, there seems no reason why this method of prophylaxis should not rank in importance with that of Crédé.

J. BURDON-COOPER.

V. MORAX (Paris). *Précis d'Ophthalmologie*. Paris: Masson and Cie., 1907.

By those who are sufficiently familiar with the French language this will be found a useful and reliable compendium of ophthalmology. It deals in quite sufficient detail with all important matters connected with diseases of the eye, and its guidance is presented in terse, clear, straightforward sentences which inspire confidence in the teaching. That such confidence is not misapplied of course goes without saying, when the writer of the book is a worker so eminent as M. Morax. The book extends to 600 pages, and the diagrams, especially those illustrating steps in the operations described, are eminently illuminating and helpful. In some instances it is true they lack elegance, but they make up for that in solid value.

S. THEOBALD (Baltimore, U.S.A.). **Prevalent Diseases of the Eye.** London and Philadelphia: W. B. Saunders & Co., 1906.

THE author writes this book not for the specialist, but for the general practitioner, and devotes it to consideration of such diseases as he (the physician) may properly be expected to recognise and to treat. It contains therefore little regarding the ophthalmoscope, for the author is wise enough to know that whatever he may have been taught as a student the general practitioner is, speaking generally, not an adept in the use of that instrument; nor is there any detail regarding operations, for he is not likely to perform these; nor is there too prolonged an account of refraction and of the treatment of its errors. Dr. Theobald's aim then was to write “ not a complete treatise upon diseases of the eye, but a concise description of the commoner ocular maladies ”; of such a book he is convinced there is a real want, and this want he has endeavoured to supply. It must be admitted that he has very fairly succeeded; the chief fault, from this point of view, being that the book is too big, for if the physician has time to read all its 500 pages he might as well have read a complete treatise; in some parts it is certainly redundant. But it is pleasantly written, in a style calculated to appeal to the group to which it is specially

addressed, and is not overlaid with half-a-dozen theories regarding each fact, as some books are apt to be. Some of the diagrams, coloured and not coloured, original and borrowed, are very good indeed; others are far from being so successful.

V. MORAX (Paris). **Ocular Affections in Trypanosomiasis.**
Annales d'Oculistique, December, 1906.

MORAX in this work gives an account of his observations upon the different affections of the eye met with in nagana, surra, mbori, souma, mal de caderas, dourine and sleeping sickness—types of a general trypanosomiasis all of which have now been traced to a specific trypanosome.

It is beyond the scope of this short review to allude to the incidents of the several diseases above named in animals, or even to describe them; suffice it to say they are for the most part specific fevers occurring chiefly in the mammalia and characterised by subcutaneous extravasations of coagulable lymph, fever, malaise, emaciation, paralysis, somnolence, destruction of red blood cells and the constant presence in the blood or cerebro-spinal fluid of a specific trypanosome. As a rule they are fatal, but the course of the disease is influenced by the resistance the animal offers, and in this there are great variations. Eye affections occur in most of them, and especially do they occur in those animals in which the disease runs a chronic course.

The various eye affections met with by Morax are as follows:

Blepharo-conjunctivitis with purulent secretion among rabbits affected with nagana, surra and dourine, among dogs affected by nagana, surra and mal de caderas, and sometimes among horses with dourine and mal de caderas. The discharge in the conjunctivitis caused by the proliferation of the trypanosome in the conjunctiva contains the parasite; the variety of conjunctivitis which invariably accompanies its corneal and intra-ocular localisations is not specific.

Lesions of the cornea are very frequent, and occur most often in the form of an interstitial keratitis. The cornea becomes opaque and intensely vascular, and the animals often succumb before the lesions have time to clear. Morax has been able to show that the interstitial keratitis in dogs affected with surra and dourine resulted from the proliferation of the parasite in

the inter-lamellar spaces of the cornea. In horses (nagana and dourine) Morax observed an interstitial keratitis, the clinical course of which resembled very closely syphilitic interstitial keratitis as found in man.

Superficial ulceration of the cornea occurs as a complication of interstitial keratitis, and often becomes the starting point of secondary infections which invariably result in destruction of the eye. In a horse (souma) keratitis was accompanied by a superficial vascularisation of the upper half of the cornea analogous to trachomatous pannus.

Iritis and irido-cyclitis with purulent exudation into the anterior chamber often accompany interstitial keratitis, and were observed in nagana, surra, dourine and mal de caderas of the dog. The presence of the trypanosome in the aqueous, iris and ciliary body has been demonstrated by inoculation and in stained sections. Morax has not been able so far to study ophthalmoscopically the lesions of the retina and choroid found in trypanosomiasis, but the *post-mortem* examination of the eyes of dogs affected with surra and dourine has shown that such lesions are not infrequent. They are, however, of minor importance to the keratitis or irido-cyclitis along with which they invariably occur.

Divers ocular affections have been described as occurring in sleeping sickness, but, with the exception of œdema of the lids, which is an almost constant accompaniment, these are decidedly equivocal.

J. BURDON-COOPER.

KÜSEL (Königsberg). **The Cause of Central Atrophic Retinitis (Kuhnt).** *Klinische Monatsblätter für Augenheilkunde*, November, 1906.

REIS, in his paper on "Holes at the Macula," brings forward four new cases; the second of the patients was suffering from albuminuric retinitis, and showed a hole at each macula. Reis's theory is that the condition in traumatic, as well as in idiopathic, cases is due to œdema. Küsel, in criticising this, considers that the hypothetical temporary œdema is given an undue importance, whereas the vascular changes and subsequent loss of nutrition are not considered. Berlin's numerous cases of œdema without subsequent injury to the macula and the still more numerous albuminuric retinitis cases, etc., without holes at the macula, show that œdema alone is in-

sufficient to account for the condition. At the same time it is possible that the capillaries surrounding the macula are compressed by the œdema, and degeneration may result. With the ophthalmoscope capillary changes cannot be made out, and only gross changes in larger vessels can be seen. Of this type are Case xii. in Haab's Atlas and Reis's second case. Uhlrich, of Königsberg, published in 1903 a case in which he found a hole at the macula in one eye, and in the other typical arterosclerosis with small choroido-retinal deposits at the macula. The hole preceded a hæmorrhage into the vitreous.

To these cases Dr. Küsel now adds his own. A woman, aged 20, and unmarried, came, in July, 1906, complaining of a flickering in the left eye. V., R.E. = $\frac{6}{6}$, L.E. = $\frac{6}{36}$ partly. Fields full, no scotoma. Right fundus practically normal. The left disc is pale; overlying its nasal half and the vessels is a fairly dense veil of connective tissue. From the upper and lower borders of the disc, where the veil ceases, retinal bands arise, the lower crossing the inferior temporal vessels superficially. The bands unite at about a disc breadth, to form a complete oval, and from the convexity of this a D-shaped band passes out towards the macula, where it blends with a grey-white sheet which covers the macula nearly completely. There is a circular hole in this sheet through which what appears to be the macula is seen. The edges of the hole show a definite parallax movement. There are three small pigment dots seen through the hole at the macula, and the sheet itself also shows pigmentation above the hole. The retinal vessels, particularly the veins, show thickenings of their walls and narrowing of the blood stream in many places. The superior and inferior macular arteries are very small, and extend only for a very short distance. Three small venous twigs from the temporal veins to the macula are obliterated. The condition is probably due to an old inflammatory process of a severe neuro-retinitic type. The only illness of which there is any record is that of diphtheria in childhood.

Küsel rather inclines to the view that the circular opening in the veil overlying the macula is a rent, and in favour of this obtained a history of a blow on the forehead. A good coloured plate of the fundus appearances accompanies the text, and from a study of this we fail to agree with this view. The veil is made up partly of a series of loops, and we see no reason why the macula opening should not correspond with one of these.

E. W. BREWERTON.

E. ROLLET (Lyons) and MOREAU (Lyons). **Treatment of Hypopyon by Capillary Drainage of the Anterior Chamber.**
Revue Générale d'Ophtalmologie, November 30th, 1906.

It seems difficult to extol a new method of treatment of hypopyon keratitis after the innumerable procedures which have already been described for combating this frequent and redoubtable affection. The old method of Saemisch has not been replaced by any other really new surgical technic, although the direction of the incision has been modified by certain operators. Yet the pus when evacuated has a tendency to reaccumulate quickly, and one may have to re-open the wound with a probe. Another complication, by no means uncommon, is prolapse of the iris or its fixation between the lips of the corneal wound. In many cases of hypopyon cauterisation of the ulcer is insufficient, and it is necessary to open into the anterior chamber, especially where the hypopyon is extensive. Speaking generally, when a layer of pus exists which reaches to two-thirds of the distance from the limbus to the pupil margin (or about 2 m.m. of pus), the authors hold that the anterior chamber not only ought to be opened at once, but also drained. On account of the smallness of the space to be drained, it is necessary to have recourse to capillary drainage, which has been practised by Rollet for several years in the following manner:—

The patient is placed on the operating table after local anæsthesia with cocaine; the lids are separated; the conjunctiva is held at the upper end of the vertical meridian of the cornea with fixation forceps. By means of a Graefe's knife the cornea is punctured at the limbus at a point half-way between the inferior border and the pupillary aperture. The knife quickly traverses the purulent mass and arrives at a point symmetrically corresponding to that of entrance. The counter-puncture is thus made in the limbus. The operator now slightly raises the handle of the knife in such a manner as to enlarge the point of exit. The instrument is then withdrawn without cutting the remaining bridge of the cornea. By the point of entrance a horse-hair of medium calibre and 5 or 6 cm. in length is introduced and passed across the anterior chamber through the pus and out at the wound of counter-puncture. The hair should extend on either side about 2 cm. beyond the cornea. The lids are closed, and an occluding dressing is applied to both eyes.

Next day the dressing is removed, and the pus is found to have completely disappeared. The drain may be left in the place for forty-eight hours. The ulcer, which has been impregnated with mercurial ointment, has begun to clear.

In order to introduce the drain it is necessary to previously curve the hair so that it may more readily enter the point of exit. If one does not thus succeed it may be necessary to first pass the needle of a syringe with the point rounded off, and then pass the hair through its lumen; the needle is next withdrawn and the drain left in place. It is not necessary to remove the purulent mass as it will have completely disappeared next day. Sometimes the cornea is sectioned by the drain, but when the hair becomes free cicatrization has already taken place behind it, and there is never prolapse of the iris. The dressing is placed on both eyes in order to restrict these movements and limit the possibility of the drain coming out. The authors publish particulars of seventeen cases which have been treated with success by capillary drainage.

E. M. LITHGOW.

DE BERARDINIS. **Case of Rodent Ulcer of the Cornea Cured by Transplantation of Corneal Tissue from the Rabbit.**
Annali di Ottalmologia, 1906.

THE terms chronic serpyiginous ulcer and Mooren's ulcer are certainly preferable to that of rodent ulcer, which is a designation better reserved for rodent epithelioma. Since Mooren's classic paper of 1867, in which he gave for the first time a clear description of this form of ulcer, defining it from other serpyiginous types of ulcerations of the cornea, there have been published a considerable number of cases of this affection. The best paper on this subject in this country is certainly that of Mr. Nettleship, read before the Ophthalmological Society (Vol. xxii., 1902), based on an examination of eighty-four cases, to which he added twelve of his own.

De Berardinis now adds to the literature another case, which has the peculiar clinical feature of being traumatic in origin. Briefly, the facts are, that at the end of December, 1903, a woman, aged 29, was struck in the left eye by a piece of charcoal, which lodged in the inner corneal margin and was not removed for several days after. At the site of lodgement an ulcer formed, which when the patient presented herself had been present

for over two months. The ulcer was shallow with undermined edges, and a leash of vessels ran in from the conjunctiva. As ordinary therapeutic methods, including 1 per cent. corrosive sublimate and the actual cautery, failed in arresting the onward progress of the ulcer, De Berardinis decided, as the condition was approaching the pupillary margin, to excise the whole ulcerating area and to replace the tissue so removed with a corneal graft. This he did by cutting with a Graefe's knife vertically down the cornea 1 m.m. in front of the infiltrated margin of the ulcer to a depth of $\frac{1}{2}$ m.m., and then cutting horizontally outwards underneath the ulcer, removing it *en masse*. The tissue thus removed was replaced by a flap taken from the cornea of a rabbit. The graft was kept in position by sutures through the bulbar conjunctiva. Three days later the transplanted cornea appeared swollen, infiltrated and opaque, and standing out above the level of the cornea. In time, however, the graft became vascularised and eventually level with the cornea proper. At the date of writing the flap had so cleared up as to allow the angle of the anterior chamber and the iris to be made out through its substance. Cultures made from the ulcer yielded bacteria with a tendency to grouping in fours (tetrads).

Histologically the excised piece of cornea showed the usual characteristics of an ordinary corneal ulcer.

At the discussion on Mr. Nettleship's paper, already referred to, the late Mr. Little described a case, also in a woman, which, when he saw it, had resisted all kinds of treatment, and in which he subsequently transplanted a corneal flap, with good result. The disease in this case had followed an attack of influenza.

THOMSON HENDERSON.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED
KINGDOM.

January 31st, 1907.

The President, Mr. PRIESTLEY SMITH, in the chair.

CARD CASES.

Extensive Colobomata of each Lens.—Mr. Charles Blair.

This patient, aged 17, shows a large deficiency in the lower border of each lens. No coloboma of the iris or the choroid; nor are there any

changes in the fundus. The pupils are equal and active, are centrally placed, but are tremulous below. There is no history of any defects in the family, and no other deformities of any kind.

$$\text{R.V. } \frac{6}{60}; \text{ c } \frac{+ \cdot 5 \text{ sph}}{- 5 \text{ cyl axis } 170^\circ} = \frac{6}{9} \text{ pt.}$$

$$\text{L.V. } \frac{6}{60}; \text{ c } \frac{+ \cdot 5 \text{ sph}}{- 4 \text{ cyl axis } 170^\circ} = \frac{6}{9} \text{ pt.}$$

A Case of Rosacea, associated with Keratitis.—Mr. R. Cruise.

W. B., aged 47, attended St. Mary's Hospital on December 14th, 1906, complaining of pain in the right eye. Twenty years previously he had erysipelas of the face, and ever since that time he has had repeated attacks of rosacea. Five years ago the left eye became painful and inflamed, and later the right was also affected; since then several attacks of pain, photophobia, and great tenderness have occurred with exacerbations of the cutaneous affection. As soon as the eye got well, the face also improved.

The right cornea showed much conjunctival congestion, with some roughening of the lower third of the cornea; this was followed by dense infiltration over the same area, most marked over a nodule of epithelial opacity; there were no vessels seen and no staining.

In the left cornea there was a more diffuse general haze, quite superficial, with fine ribbon-like bands of opacity stretching across which looked old.

Both corneæ showed a faceted appearance. The treatment consisted in ichthyol, sulphur, and resorcin for the face, with quinine lotion and zinc and atropin ointment for the eye; and the case was gradually improving.

Family Optic Atrophy in Mother and two Children.—Mr. R. Marcus Gunn.

CASE I. Mrs. C., aged 39, says that her sight has been bad ever since she can remember, and she thinks that it is better now than it used to be.

R.V. $\frac{6}{36}$ with central scotoma for red and green.

L.V. $\frac{6}{9}$ with no scotoma for colour.

The fields in both eyes show marked peripheral limitation. By ophthalmoscopic examination the optic disc appears grayish-white, the lamina cribrosa is plainly seen and the vessels are normal.

She had whooping cough and measles in childhood, and 16 years ago enteric fever, but no bad effects were left as regards the sight.

CASE II. Doris C., aged 8, has the history that the sight has been known to be defective since the child was 5 years old.

R.V. $\frac{6}{12}$ pt. L.V. $\frac{6}{18}$ pt.

No colour scotoma. Light-difference sense good. Fields show peripheral contraction in both. The optic disc is very pale with the lamina cribrosa showing very distinctly, but the vessels are normal, and the margin of the disc is somewhat blurred. The child has had whooping cough and measles, but no other serious illness.

CASE III. Leo C., aged 4. The mother knows the vision has been defective for at least a year, perhaps longer. There is hypermetropia of about 6D with some slight astigmatism; the optic disc is very pale and the vessels are normal; no other fundus changes.

The only other child, aged $2\frac{1}{2}$, has excellent sight and is always asked by the brother and sister to look for things for them.

The parents are first cousins, but there is no history of defective sight in the family.

A Case of Sympathetic Ophthalmia treated by recognised methods, and afterwards for two relapses by acetozone combined with hydrotherapeutic measures with good results.—Mr. Charles Wray.

R.W.B., aged 31, got a foreign body in the right eye on June 3rd, 1903, and was admitted into a large general hospital on June 9th, when it was removed, an iridectomy being performed at the same time. On June 23rd vision was $\frac{6}{18}$ and the tension normal; he attended the out-patient department until July 23rd, when sympathetic ophthalmia was found to have developed; the treatment adopted was atropine and administration of mercury by injection or inunction. The results of the treatment were that the condition continued for nearly twelve months, during which time the vision in the right eye declined from $\frac{6}{36}$ to P.L. only, while that of the left varied from $\frac{6}{60}$ to $\frac{6}{6}$ and eventually settled down to a permanent $\frac{6}{9}$.

The patient came to the Croydon General Hospital on December 16th, 1905.

R.V. was P.L. L.V. $\frac{6}{18}$.

Patient says that the left eye got worse during the previous week; there was no ciliary infection but a large number of dots of keratitis punctata. Atropine was prescribed and the patient was put on the acetozone-hydrotherapeutic treatment, and on December 20th the vision of the left eye was up to nearly $\frac{6}{9}$. On January 3rd, 1906, the keratitis punctata had almost gone, and by January 13th, it had completely disappeared, and the vision was $\frac{6}{5}$. He attended the Hospital until March 24th,

when he was discharged quite well. On December 12th, 1906, he returned again with vision of $\frac{6}{12}$, and was treated with mercury until January 16th, 1907, with no improvement; he was then put on the same treatment as before, with the result that on January 22nd there was very little keratitis punctata and the vision was $\frac{6}{6}$.

The treatment consists in the following directions:—

Before breakfast:

1. Drink $\frac{1}{2}$ pint of warm water.
2. Take one capsule of acetozone containing 2 grains.
3. Walk briskly for 10 minutes in open air.
4. Drink a second $\frac{1}{2}$ pint of water.
5. Walk for 10 minutes as before.

Repeat at 10 a.m., 3 p.m., and 6 p.m.

Partial Thrombosis of the Central Vein.—Mr. J. Herbert Parsons.

Grace A., aged 21, came as an out-patient on November 7th, 1906, with the history that 6 days before she awoke to find her vision dim in the right eye; her sight was perfectly good before that time, and during the day the dimness increased, continuing about the same until she came under observation. Her general health was good.

R.V. $\frac{6}{60}$ barely. L.V. $\frac{6}{5}$; no H.M. and normal in every respect

On ophthalmoscopic examination of the right eye there was a whitish reflex from the fundus; the disc was hazy and slightly swollen, the arteries almost completely hidden and the veins intensely engorged and convoluted like a typical case of thrombosis of the central vein; there were broad bands of exudation along the course of the veins, which were hidden at frequent intervals by the retinal œdema, and also a few flame-shaped hæmorrhages. She became an in-patient at University College under the care of Dr. Rose Bradford, and the medical examination revealed nothing abnormal.

On November 18th another ophthalmoscopic examination was made, when a red reflex was seen, the exudate had nearly gone though the white lines remained, the disc was slightly hazy, the arteries were visible and smaller, and the veins were less engorged and nowhere hidden. There were a few chalky-white round patches of exudate scattered over the fundus and a few minute hæmorrhages. At the macula was a large circular area about $1\frac{1}{2}$ discs diameter, filled with brilliant white spots, like those of albuminuric retinitis; in the centre of this area was a chalky-white patch with a dark flame-shaped hæmorrhage in it.

On December 6th the picture was much the same except that the centre of the macula was now red and surrounded with many brilliant spots with a tendency to radial distribution, the whole area being bounded

by a further ring of similar smaller spots; some of these central spots were cholesterine.

On December 20th all the changes were much less marked, the macula being the only place where there were definite appearances and these were slighter. The vision was $\frac{6}{18}$. On January 17th, 1907, the vision was $\frac{6}{9}$. On January 31st there were still the bright spots at the macula surrounded by the circle of smaller ones, and the arteries and veins were diminished, the arteries relatively more so than the veins.

The explanation of this case must be that of partial thrombosis with rapid restoration of a portion of the circulation.

PAPERS.

A Case of Tubercle filling the Eyeball in which the Opsonic Index was regularly taken.—Mr. Simeon Snell.

This was the case of a boy, aged 12, who came for treatment on April 25th, 1906. Four months before he had pains in left arm and leg, and two months later swellings appeared which eventually developed into abscesses; these were opened and got quite well. About the same time the sight of the left eye began to fail, and the eyeball was a little more prominent than that of the opposite side. The iris dilated fully to atropine; the tension was normal, the vision was nil, and there was no pain.

Ophthalmoscopic examination showed a yellowish-grey mass, nodular in parts, occupying the interior of the eyeball, with retinal vessels passing over it; it appeared to be growing from the choroid; the lens was clear.

General treatment was at first tried; *i.e.*, cod liver oil and malt, with open-air life. On May 6th severe pain occurred over the frontal and temporal region, with the appearance in four days of some blood in the anterior chamber; the eye was painful and tension was +1.

Tuberculin injection was now tried, and a chart recording the opsonic index was regularly kept; a distinct rise in the index was observed after the first injection; the eye got smaller under the treatment, and the general health improved, but on September 17th it was considered advisable to excise the eye.

The pathological examination revealed an inflammatory growth in connection with the choroid showing giant cells and degeneration in places, but no definite tubercle bacilli were found.

A Family Tree of Nyctalopia.—Mr. Simeon Snell.

Mr. Snell showed a chart giving the family history of a man aged 45, whose vision was $\frac{1}{40}$ in the right eye, and $\frac{1}{60}$ in the left, and whose fundus showed the typical appearance of retinitis pigmentosa.

The chart included 64 members of the family and went back to the patient's grandfather, who was himself affected. Twelve persons in all were the subjects of retinitis pigmentosa, 9 males and 3 females; and an interesting feature was that of the children of the males, the girls only were affected, and of the children of the females the boys only were affected.

Two Cases of Streptococcic Infection of the Conjunctiva.—Mr. Arnold
Lawson.

Mr. Lawson described the history of two cases which came under his observation, and which presented very similar clinical features. They both ran an extremely rapid and virulent course with subsequent sloughing of the cornea in both eyes. One was the case of a baby, whose eye began to show slight watery discharge 16 days after birth, which almost cleared up under ordinary treatment in about a week, but from that time the cornea showed signs of being involved, and in a few days the deplorable result mentioned above occurred. The other case was that of a little girl aged 6, who 4 months before had been at a Fever Hospital with scarlet fever, followed by rhinitis and measles. The first case did not show very much constitutional disturbance, but the second child was evidently seriously ill.

No treatment seemed of the slightest avail, nor did it appear at all to control the progress of inflammation.

Pure streptococcus pyogenes was found in the first case, while both streptococcus pyogenes and streptococcus pyogenes aureus were cultivated from the second. There was very little discharge except when the slough separated, when it became more copious than at any other time.

Some Notes on Stereoscopic Vision.—Mr. Brooksbank-James.

This was a new method designed to test a patient's power of stereoscopic vision. An oblong-shaped box open at the two ends and above with the inside painted black is illuminated from the side; small round sticks are placed vertically and horizontally at a certain distance apart and in different planes; the patient views them at a distance of 6 metres through a wide opening in the front and is called upon to determine the relative position of the two sticks to each other.

MALCOLM L. HEPBURN.

THE FORMULÆ EXPRESSING THE CONDITIONS OF REFRACTION AND THE OPTICAL ADJUSTMENT OF THE EYE.

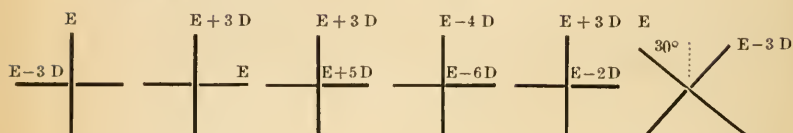
By PROF. M. STRAUB, Amsterdam.

For several years past I have employed certain formulæ for the optical adjustments of the eye, the simplicity of which greatly conduces to clearness. At first I employed the formulæ rather for illustration than for actual use, but gradually introduced them constantly in my lectures and in refraction work. At the Ophthalmological Congress in Heidelberg last summer I propounded my method for general use, and now beg permission to bring it before my English colleagues.

A primary reason for bringing forward my formulæ is the existence of an error very common among students and not altogether absent from ophthalmological literature: I ask a student to tell me the degree of myopia present in a certain case, and his answer is “ $-4D$.” Obviously he speaks of the correcting glass. But if the correcting glass is $-4D$ then the error in the eye must evidently be $+4D$. Similarly the same degree of hypermetropia might be expressed as “ $-4D$.” When we go step by step from 4 to 3, 2, and so on, till $-4D$ is reached we pass a turning point between the positive and the negative values. This point is not zero, but rather emmetropia. Therefore the complete formula for myopia of $4D$ is $E+4D$, for hypermetropia it would be $E-4D$, using E for emmetropia. The general formulæ for the two refractions are $E+nD$, $E-nD$.

For the notation of astigmatism the formulæ give the

refraction of both meridians of the astigmatic eye, in this way.



I do not consider it necessary in all cases to indicate the refraction of the different meridians on the limbs of a cross as these figures show. The formula of astigmatism is as intelligible, when both degrees of refraction are written one above the other, separated by a horizontal line and with a note indicating the direction of the meridian, in this way.

$$\begin{array}{l} \frac{E \text{ vert.}}{E - 3 \text{ D:hor.}}; \frac{E + 3 \text{ D:vert.}}{E \text{ hor.}}; \frac{E + 3 \text{ D:vert.}}{E + 5 \text{ D:hor.}}; \frac{E - 4 \text{ D:vert.}}{E - 6 \text{ D:hor.}}; \\ \frac{E + 3 \text{ D:vert.}}{E - 3 \text{ D:hor.}}; \frac{E \text{ } 30^\circ \text{ nasal}}{E - 3:60^\circ \text{ temporal}} \end{array}$$

Experience has taught me that this mode of noting refraction is very convenient for medical students, who have to give their attention to so many different topics. Even when they have studied well the theory of ophthalmological refraction, they are not prepared to employ their recently acquired knowledge practically. The terms H, Ht, Hl, Hm, MAs, etc., etc., which become so familiar with use, do not convey much meaning to them. My system of formulæ makes very easy the conception of any case of refraction to every one who has acquired the notions dioptré and emmetropia. When the lecturer has explained to his pupils the sense of these words, he may expect ready comprehension of any refraction case afterwards.

For the same reason the new notation will be an advantage for publications involving refraction cases in the medical journals intended for general practitioners. But I would not confine its usefulness to these applications. If my formulæ were of advantage to teachers only I should have kept them within the walls of my lecture room. But for specialists also they simplify the discussion and arrangement of physiological and ophthalmological questions. I will give some instances to prove this assertion.

First I would call attention to the fact that the formulæ not only state a degree of refraction but also every degree of optical adjustment of the eye. In my opinion the term optical adjustment is too seldom used. By means of the accommodation the eye goes through a series of optical adjustments, the weakest being the "refraction," the strongest the adjustment for the nearest point. Again, the adjustment is changed by trial and correcting glasses. It is convenient to use our formulæ for these adjustments. Thus, for example, the myopic adjustment $E+2.5D$ (obtained, whether by refraction, by the aid of accommodation or by trial glasses) that is convenient for a person with tolerable acuteness of vision, whose principal work is reading; and $E+2D$ that is required by a person who does manual work. So for the adjustments we have to deal with in the performance of the shadow test when adjustment is altered by glasses. And lastly the formulæ facilitate the demonstration of the equation for the amplitude of accommodation in the different refractive conditions.

I consider it of no little importance too that they direct attention to emmetropia as the basis of our nomenclature of refraction. It seems to me that

the subject of emmetropia has not attracted so much attention as it deserves, on the part either of physiologists or of ophthalmologists. Everyone knows that under the words hypermetropia and myopia lie important and difficult questions; while the difficulties involved in emmetropia hardly attract attention. And yet it is sufficiently remarkable that nature succeeds in adapting the majority of eyes for parallel rays. It is true that paralysis of accommodation generally changes this emmetropia into a low degree of hypermetropia, varying from $E-1$ to $E-1.5D$. Still this hypermetropia is brought up to the emmetropic adjustment by a very accurately regulated tone of ciliary muscle.

When emmetropia is considered in this light it will be acknowledged that, in addition to the optical definition of emmetropia, a physiological definition is also required. It would be inaccurate to define emmetropia as the normal refraction of the eye, since the average refraction both during the first period of life and in old age is hypermetropia, and since even at the prime of life—as was just mentioned—the refraction, *i.e.*, the adjustment after total relaxation of accommodation, is hypermetropia. In my opinion the wanted physiological definition should say that emmetropia is the ideal refraction of the eye. Nature tries to make the eye emmetropic and to maintain this refraction. The hyperopic eye of the newborn in the first years of life not only undergoes an enlargement, but very considerable changes in its proportions, tending to bring the eye nearer to emmetropia. The work at short distance during school years makes a serious attempt to elongate the eye and to produce myopia. Still in two thirds of the cases emmetropia wins. The ophthalmoscope reveals that this battle in most eyes is not gained without

damage. Nature wishes emmetropia. Here, as in other parts of the body, as to quantity the form is governed by the function.

Ophthalmological progress has taken emmetropia as the zero of our scale for the adjustments of the eye. Our formulæ have the advantage that they point out in every case the relative character of ophthalmological refraction. Even should no eye possess exactly emmetropic refraction, it would be convenient to compare the existing adjustment with that for parallel rays. Since emmetropia is the ideal refraction, it is the better chosen for the starting point of refraction nomenclature.

At the outset I have given a very simple, even popular, derivation of the proposed formulæ. From a scientific point of view another mode is preferred, which makes no use of correcting glasses. It is based on the fact that the convergence of a pencil of rays is measured by the inverse value of the height of the pencil. So, for instance, the convergence of the pencil travelling from a lens to its principal focus at a distance f is equal to $1/f$. Thus convergence, and with a negative sign divergence, may be measured in dioptries. Gullstrand taught that we should apply this definition of convergence to the lens-formula. When we write this formula in this way:

$$-\frac{1}{p_1} + \frac{1}{f} = \frac{1}{p_2}$$

we may read it according to Gullstrand, thus: the divergence of the incident rays, modified by the convergence imposed by the lens upon parallel rays, is equal to the convergence of the refracted rays. Applied to the eye, the formula says that the divergence of the rays sent out by the retina,* modified by the (physical) power

* Increased by the index of refraction of the vitreous humour.

of refraction of the eye, is equal to the convergence of the pencil directed from the eye to the farthest point. Now the convergence of this pencil is the ophthalmological refraction of the eye. When it is *nil* there is emmetropia; the degree of convergence of the rays is the measure of the myopia, their degree of divergence of the hypermetropia. This convergence or divergence, measured in dioptries and contrasted with parallel rays as the standard, gives our formulæ of refraction.

THE PRISM-VERGER: AN INSTRUMENT FOR THE MEASUREMENT AND ENLARGEMENT OF FUSION POWER.

By ERNEST E. MADDOX, Bournemouth.

A SPECTACLE frame, fitted with a rotating prism before each eye was proposed and figured in the first edition of my little book on "Prisms," in 1889, but difficulties at the time prevented its manufacture.

It occurred to me recently to equip the instrument for vertical as well as horizontal measurements of the so-called "dynamic" vergence of the eyes by making one prism reversible, and the instrument, with this improvement, has now been very ably manufactured for me by Messrs. Dixey and Son. The ease with which many useful measurements can be made with this instrument is, I think, worthy of mention; and for the training of recent or occasional squints (and even of old ones after the restoration of fusion) it enables advantage to be taken of the endless variety of objects around us.

It may be regarded as the complement of the phorometer, invented by my friend, Dr. Stevens, of New York,

which it slightly resembles in principle, though differing in purpose. In the phorometer both prisms rotate in the same senses, whereas in this they rotate in opposite senses. The phorometer measures heterophoria, which my instrument, used alone, cannot. On the other hand, the phorometer will not measure vergence power, or train the ocular innervations, for both of which this is intended.

It consists of a frame in which two prisms, each of 6° deviation, are so mounted as to be simultaneously rotated in opposite senses, by turning a milled head. One prism is permanently attached to the toothed disc which bears it, but the other can be slipped out of its fitting and be reintroduced the reverse way. The object of this is to make the instrument available not only for horizontal vergence, but also for vertical.

With regard to vergence, it is only necessary to consider its four cardinal varieties, *i.e.*, convergence, divergence, supravergence and infravergence. Vergence relates to the bearing of the visual axes with reference to each other, not to their parallel movements. In speaking of supravergence and infravergence, it is necessary to specify to which eye the word belongs. As a generic term, however, we may speak of "vertical vergence," to avoid reference to one eye more than another; and in so speaking we assume supravergence of one eye to be necessarily equal to infravergence of the other. In all non-paralytic cases this assumption is correct.*

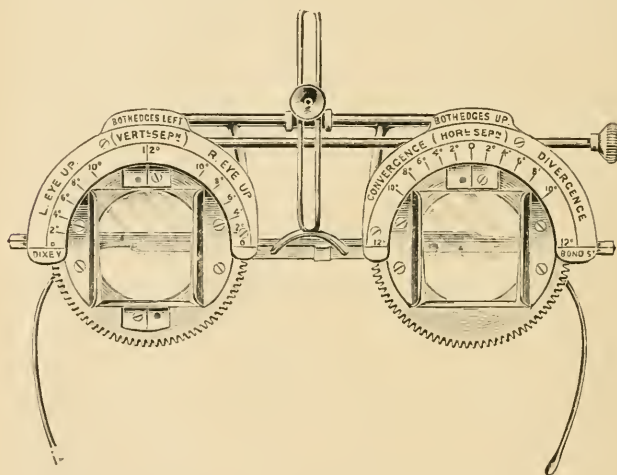
Directions for Use. A celluloid arch, graduated in degrees, surmounts each prism. The markings on each arch relate, however, not to the one prism only, but to the two jointly, one arch being used for horizontal vergence,

* Unless just possibly in extreme cases of the anaphoria or kataphoria of Stevens, when the head is held rigid.

and the other for vertical vergence. A little study of these arches will make the use of the instrument self-evident.

I. DETERMINATION OF VERGENCE POWER.

(a) *To measure horizontal verging power.* Start with both prisms edge up, with their indices pointing to zero. Both visual axes are not equally deflected upwards by the full strength of each prism, viz., 6° , but they experience no lateral deflection. Direct the patient's attention to a candle flame, Snellen's test types, or any distant object at



the distance of, say, 6 metres or more, requesting him to notify the first appearance of double vision. Rotate the milled head counter-clockwise; then the index will leave zero and travel outwards along the quadrant marked "divergence."

On the first appearance of diplopia read off the result, which specifies the patient's prism-diverging power in distant vision. Next, rotate the milled head in the opposite direction and discover in a similar way from the numbers

of the inner quadrant marked "convergence," his prism-converging power. But in making his convergence test it is important that the patient should signify the moment at which the lowest test types he can read become indistinct, otherwise the test becomes one merely of the total convergence rather than for the relative convergence during accommodation for distance.

(b) *To measure vertical verging power.* Place the tip of the right forefinger behind the reversible prism, and the thumb on its front face to withdraw it from its fitting. Reintroduce it "base upwards" (so that now one prism has its edge upwards and the other its base upwards), and rotate the milled head clockwise so as to cause the base of the movable prism to rotate inwards and that of the fixed prism outwards. As soon as the index of the movable prism points to 12° and that of the fixed prism to zero, confine attention to the arch over the fixed prism, which it will be noted relates solely to vertical vergence. As its heading indicates, we have commenced with the edges of both prisms pointing to the patient's left. Now rotate the milled head counter-clockwise until diplopia is awakened; the angle of artificial elevation of the right eye above the left (right supravergence) is read off from the inner quadrant which is marked "right eye up."

Rotation of the milled head in the opposite direction, so as to raise the basal index will in a similar manner measure the angle of artificial elevation of the left eye above the right (left supravergence) on the quadrant which is marked "left eye up."

II. ENLARGEMENT OF VERGENCE POWER.

(a) *When single vision exists.* Proceed exactly as above, but linger at each point where diplopia threatens,

encouraging the patient to exert every effort to maintain single vision while the prisms are rotated through small arcs, so as alternately to relax and stimulate the effort of fusion. The exercise may be varied by letting the frame be worn for half an hour or more at a time, with the prisms so adjusted as to exercise the fusion faculty in any direction in which it may appear deficient.

Thus if the object be to get rid of is—

(α) *Esophoria*. Start with both prisms edge up and rotate them outwards by turning the milled head counter-clockwise.

(β) *Exophoria*. Rotate in the reverse direction.

(γ) *Hyperphoria*. After reversing the movable prism in the manner previously described, start with both prisms "edges left." To train away right hyperphoria rotate the milled head clockwise, and counter-clockwise for left hyperphoria. It will be noted that when one eye ascends, the other descends at an equal rate, and the figures record the sum of the combined deviation.

III. TO TREAT SLIGHT SQUINTS BY EXERCISE.

Commence with the apices of the prisms pointing in the direction suggested by the squint. Thus, for convergent squint both apices will be inwards, for divergent squint both outwards. For upward squint each prism should start with its edge to the left. Then rotate the prisms so that the edge of each shall seek the direction of the vertical deviation of the corresponding eye until diplopia gives place to single vision. Thereupon slowly rotate the edges back again till diplopia threatens, and there leave them for a short while, adding, if thought well, slight intermittent rotations of small arc. For example, in right upward squint the edge of the right prism would

first be rotated upward to secure single vision, and then slowly downward again till on the verge of diplopia. In left upward squint the edge of the left prism should be similarly manœuvred.

IV. TO ESTIMATE DEPARTURE FROM THE STATIC BALANCE OF THE OCULAR MUSCLES (HETEROPHORIA).

The instrument can be used in much the same way as Risley's double prism. A set of glass rods should be held before one of the prisms (horizontally for testing the horizontal balance, and vertically for testing the vertical balance) at the same time that the attention of the patient is directed to a distant source of light.

If measuring the horizontal balance, start with each prism edge up, and rotate the milled head until the streak of light passes through the flame. The heterophoria is then read off from the quadrant marked "convergence" or "divergence," as the case may be.

To measure the vertical balance, set each prism "edge left," and again rotate the milled head till the streak passes through the flame, reading off the result on the quadrant to which the index points, marked "left eye up" or "right eye up" as the case may be.

It may be remarked that while this instrument, if correctly made, measures hyperphoria with complete accuracy, it is not so suitable for measuring the horizontal balance as the use of the rods simply with a tangent scale on the wall.

After abstracting the detachable prism the remaining one can be employed, as Mr. Dixey suggests, to reduplicate the writer's arrow tangent device for the measurement of horizontal heterophoria in near vision.

REVIEWS.

L. HEINE (Breslau). **Retinal Lipæmia and Lowered Intra-Ocular Tension in Diabetic Coma.** *Klinische Monatsblätter für Augenheilkunde*, December, 1906.

FROM the clinique at Breslau comes the record of a case of much interest alike from an ophthalmic and from a medical point of view, for the cases in which the peculiar appearances described have been seen during life are very few indeed.

The patient was a lad of 17, who first came under observation in April, 1904; he was then in very bad condition, his urine contained 6·7 per cent. of sugar, as well as acetone and acetic acid. He improved for a time under treatment and gained weight, but returned in November of the same year having again lost flesh badly, and with thirst and great appetite; the urine was in even worse case than before. He began to complain of pains in the hypogastric region; this was the first symptom of special moment, and his temperature went up and down irregularly. He improved again, but his urine was never free from acetone, and he never really picked up much. A year later the pains in the abdomen began again and became very severe; on 1st November the peculiar appearances in the fundus, to be discussed later, were first observed; on 5th November the intra-ocular tension was -1 or even -2 ; well-marked diabetic coma came on, and he died on that day. It seemed that for more than a week before his death he had avoided taking the alkali which he had taken for long. Two days before his death the urine contained sugar, acetone, acetic acid and oxy-butyric acid; and "coma-cylinders" were found in numbers. The skin of the face and body had a greasy look, and the cheeks were bluish in hue. For a number of hours before death the intra-ocular tension was much lowered, but the pupil reaction was quite good, and the patient complained of no difficulty of sight. At this time the Riva-Rocci apparatus gave the pulse tension as 108—115. A specimen of blood taken eight hours before death showed sp. gr. 1024; it contained fat to the amount of 8·65 per cent., the melting point of which was $37-38^{\circ}\text{C}$. Centrifuging gave a snow-white, creamy deposit. To sum up, the case was one of a young diabetic dying of coma. The coma set in with abdominal pains, deep inspirations and frequent pulse; at the same time there were "coma-cylinders" and the ocular tension was lowered; cerebral symptoms followed later.

Ophthalmoscopically, the chief point to be noted was the strange colour of the retinal vessels, which looked as if they no longer contained blood but milk. The general colour of disc and fundus was not abnormal, and there was no opacity or dulness of the retina whatever. In the large vessels one could distinguish arteries from veins (but not in the smaller branches), the arteries being pale-reddish, the veins having a slightly violet tint; both were rather dilated, and both had an appearance suggesting ribbons rather than cylindrical vessels. Heyl described the aspect in the first recorded case as salmon coloured; the veins and arteries as both much dilated and indistinguishable from one another. White related a case in 1903, giving a coloured sketch of the fundus; in this the hue of the vessels is much more definitely yellow than in Heine's, but it may have been examined and the sketch tinted in gas-light. In Fraser's case the hue is too white, on the other hand, but his illustration was drawn *post-mortem*.

It seems hardly necessary to discuss in this place the differential diagnosis, but an important question crops up in connection with the altered colour of the blood-vessels, while the fundus generally retains its usual tint, namely, this,—blood drawn from the patient has no whitish colour,—it rather resembles chocolate; why then the white colour of the vessels? Uthoff puts forward the plausible suggestion that the fat particles, being lighter, tend to arrange themselves along the walls of the vessels, which thus appear colourless, while the heavier red corpuscles remain in mid-stream. It must be remembered that the condition of things in the vessels during life is a very different matter from that in artificial tubes or in the heart, etc., *post-mortem*, in which what one sees is not blood, but blood-serum. There can be no question that what one sees in the vessels by means of the ophthalmoscope is blood, and not merely blood-serum; all the more that, as has been stated above, the patient's vision was apparently unaffected. It is certainly a singular fact that from the choroid, covered with the pigment epithelium as it is, but consisting so largely of venous channels, is given back practically a normal reflexion, and yet the retinal vessels appear whitish, although at the same time the hue of the blood let from the patient is not at all pale.

The condition of lipæmia, whether diabetic or not, is very rare indeed, but certainly in all bad cases of diabetes if ophthalmoscopic examination is made, no one could miss an appearance so remarkable as that presented in the very few

cases which have been seen; and this should be sought for even in patients (as in the present case) by whom no difficulty in regard to sight is admitted.

The author believes that when the proportion of fat found on examination of the blood reaches 4 or 5 per cent. some changes should probably be observable in the fundus, and certainly when 8 per cent. is reached.

A curious feature of the condition of diabetic coma is the lowering of the intra-ocular tension. This does not seem to occur in coma from other causes, while it appears to be as nearly as possible constant in that arising from diabetes. It is certainly not to be accounted for by the loss of watery contents on the part of the vitreous, for it does not occur in other diseases in which fluids are drained out of the tissues, but is probably caused by cessation of secretion from the ciliary processes; mere lowering of the blood pressure, though it is present in diabetic coma, will not account for it.

W. G. S.

MARCZEL FALTE (Szeged). **Treatment of Trachoma.**

SUCH volumes have been written upon the subject of trachoma from every different point of view, pathology, treatment, prophylaxis, that the ophthalmological public looks askance at any new publication upon this well-worn subject. The present monograph, however, deserves notice in our pages, as it describes in full detail the methods of treatment employed for a long period by an oculist who practises in one of the most affected districts in Hungary. The monograph contains about 100 octavo pages, and the author never diverges from the subject matter, viz., the treatment of trachoma.

Trachoma is broadly classified from a clinical standpoint into torpid, papillary, and granular, and the methods of treatment are divided into medical, mechanical and operative.

Of the medical applications, apart from "drops," douches of weak boric acid solution or permanganate of potash or sublimate or oxycyanate of mercury are employed. Nitrate of silver is used to brush the everted lids, but only in weak solution (not more than 1 per cent. or 2 per cent.), and salt solution is used to neutralise the silver salt.

Cold compresses are employed (boric acid, etc.), and occasionally warm compresses, and ointments are given for home

use. Of the ointments 3 per cent. boric acid, 1 per cent. or 2 per cent. ichthargan, 3 per cent. to 20 per cent. protargol, 3 per cent. to 5 per cent. iodoform or xeroform, 0·5 per cent. sulphate of copper, or 5 per cent. to 10 per cent. cuprocitrol are those in use.

Several powders are employed—boric acid, itrol, bortannin, iodoform and xeroform, and the conjunctiva is in some cases touched with that old favourite, finely-polished crystal of sulphate of copper.

The mechanical methods of treatment in vogue with Dr. Falta are:—

1. Massage with from 2 per cent. to 5 per cent. Pagenstecher's ointment. This must be done with care and exactness, otherwise no good result can be attained.

2. Rubbing is also employed with wool soaked in weak sublimate solution (1 or 2 to 1000) or ichthargan. This has also to be done with care and extreme lightness, and is not indicated in cases where there is much cicatricial contraction.

3. The antique method of expression of the trachoma bodies with the finger-nail, known about half a century ago as Wilde's method, is still used by Falta.

4. He employs also the more up-to-date plan of expression with roller forceps, and has constructed a special forceps which he considers to have advantages over the other instruments made for this purpose.

The operative treatment is (1) scarification, which is done with a special instrument of Falta's own, or, better still, what he terms (2) *lævigation*. This is a proceeding which differs from curetting or scarification. It consists in passing lightly over the surface a small steel instrument like a dentist's drill, except that the ridges and depressions are very minute. This is rotated with extreme rapidity by an electro-motor, and, if properly used, clears off trachoma bodies without injuries to the conjunctival epithelium. (3) Excision of the fornix is practised also, and the method of performing the operation is described in detail. (4) Falta also excises the tarsus in suitable cases. (5) Galvano-caustic is employed also to destroy the trachoma granules, but Falta has found radium of little efficacy, although it does in time do good, and clear up pannus.

The second part of the paper deals with the special treatment of the different forms of trachoma, viz., the acute stage, the torpid stage, the papillary and the granular form.

In the acute stage boric acid douches and 2 per cent. nitrate

of silver brushings are the chief measures. Atropine is only employed if definitely necessary.

In the torpid stage 1 per cent. nitrate of silver is the treatment. In the papillary form he uses nitrate of silver, rubbing with sublimate and ichthargan, and Pagenstecher's ointment, combined, if necessary, with lœvigation or expression.

In the granular form the same remedies are useful, combined with galvano-caustic and itrol powder. If necessary the fornix is excised or even the tarsus.

In dealing with the usual pannus, Falta avoids if possible the use of mydriatics, as in all cases of trachoma. Mydriasis tends to make the patients avoid light, and this is a disease in which the more light and air the eyes can stand the better. Till the trachoma of the lids is first dealt with no direct treatment of the pannus is indicated. When the lids are fairly well the pannus may be massaged with Pagenstecher's ointment. This massage must of course be a massage of the cornea, not merely of the conjunctiva. Falta attains this by what he terms control-massage, *i.e.*, massage while the other eye is open under the observation of the surgeon.

If this massage fails, the galvano-cautery is brought into action to obliterate the obnoxious blood-vessels, or peridectomy is performed. In very rare cases Falta uses jequiritol.

In the treatment of corneal ulcers and infiltrations the proceedings are not materially different from those employed in such lesions apart from trachoma.

Trichiasis. If the aberrant hairs are few in number electrolysis is used. If many cilia are inverted, but the inversion can be corrected by a slight pull on the skin of the lid Falta makes a cicatrix along the roots of the hairs with the galvano-cautery, and in this way everts the inturned hairs.

In more pronounced cases Waldhauer's modification of the antique Jaesche-Arlt operation is done, or the more up-to-date modification thereof, which consists in transplantation of mucous membrane to fill up the gap and keep the cilia correctly everted. These are the operations done on the upper lid; on the lower Flarer's antique excision is what Falta prefers.

Affections of the lacrimal apparatus and of the nasal mucosa must be attended to in trachoma cases. Falta details the treatment of these complications, and also gives general directions as to the employment of cocain, eucain-lactate, adrenalin, and other more or less symptomatic remedies.

L. W.

F. TERRIEN (Paris). *Anatomy of the Myopic Eye.* *Archives d'Ophthalmologie*, December, 1906.

THE author has had the opportunity of examining minutely specimens showing this condition in a high degree, and he is able to confirm much that has been previously stated in regard to the alterations present in myopic eyes, and has elucidated some points which may be fresh. The eyes specially submitted to examination showed aberration of 6, 18 and 25 dioptries respectively. They were fixed in a 10 per cent. solution of formol and were embedded in collodion; the staining was done in the ordinary manner.

Regarded externally, the globe which represented 25 D. of myopia, measured antero-posteriorly 32 m.m., and its transverse equatorial diameter was 21 m.m. When compared with an emmetropic eye the whole of this elongation was confined to the posterior segment of the globe, differing in this respect from cases of hydrophthalmos, in which both the corneal and the inter-ciliary diameters are much increased. In the normal eye the sclerotic gradually increases in thickness the more nearly it approaches the posterior pole of the eye, until it reaches the point of entrance of the optic nerve. In all the myopic eyes examined the contrary was found, viz., that the more nearly the optic nerve was approached at the site of its fusion with the globe, the more pronounced became the thinning of the scleral coat; the ectasia, moreover, was greater on the temporal side of the eye than on the nasal side; while in cases of hydrophthalmos there is a uniform thinning of all parts of the sclera. Corresponding with the degree of thinning the individual fibres composing the sclera were less compactly interlaced together. In eyes presenting a high degree of myopia, at many points there were close adhesions found between the scleral and the choroidal coats, and these were more numerous than in the normal eye; in myopia of lesser degree there were no changes beyond the thinning of the sclera towards the posterior pole. There were no agglomerations of leucocytes present, nor was there any evidence of newly-formed blood-vessels.

These specimens afforded evidence that the thinning of the sclera cannot be entirely due to the existence of the distension process, but that there is also a certain amount of atrophy; and the author is of opinion that there is generally some

congenital predisposition or tendency towards thinness of this outer coat, which favours the later occurrence of the backward distension. In a different category, of course, are those cases presenting malignant features, which are associated with attacks of scleritis during the course of certain infective morbid processes.

Attention is drawn to the distinction to be made between the distension of the posterior pole, the true *staphyloma posticum*, and the peripapillary changes, which constitute the myopic crescent or conus. The latter appearance is probably due to tearing away of the elastic lamina of the choroid, which drags with it the pigmentary layer. In the author's case of myopia of 25 D the elastic lamina was absent over a large area. On the other hand, on the nasal side, the retina, and even the choroid, may be dragged over on to the disc (super-traction). Even the optic nerve sheath may be found distorted, the intravaginal space being increased on the temporal side and diminished or obliterated on the nasal side.

In the anterior segment of the globe there is less deviation from the normal. The anterior chamber is found to be deeper than in the emmetropic eye, and this is usually more pronounced the higher the degree of myopia; in the author's specimen of -25 D the depth of the anterior chamber was double that found in an emmetropic eye; along with this increase there is greater separation between the root of the iris and the sclero-corneal limit. Tears or fissures of considerable extent are to be found in Descemet's membrane, similar to those which have been found in instances of hydrophthalmos and of kerato-conus, and due in both cases to distension of the globe. These ruptures do not appear to have been previously described in cases of myopia, except in a recent communication of Bruno Fleischer. They can be discovered clinically by careful use of oblique illumination and a high magnifying power; they are then apparent as linear striæ with a double contour. Search should be made for them in all cases of high myopia; their presence would appear to indicate a progressive phase in the myopia. Similar lesions, though more difficult of demonstration clinically, probably occur in the membrane of Bowman; and they appeared to have reached a maximum degree in the author's case of high myopia, where no trace of that membrane beyond a few fibrillary fragments was to be seen in any of the sections examined.

Another change to be noted is slightly increased curvature

of the cornea, owing to the distension of the posterior segment; in hydrophthalmos, on the other hand, the corneal curve is diminished. A marked effect of the distension of the globe is to be seen in the relations of the uveal tract to neighbouring parts. The root of the iris is retracted, and, more particularly, the angle between the ciliary processes and the iris is drawn backwards and opened out, so that in one of the author's specimens it was as much as 1.5 m.m. behind its normal position.

With regard to the ciliary muscle, the circular fibres were found to be very deficient, the muscular tissue being composed almost entirely of longitudinal bundles; this confirms previous observations made by Ivanoff, although in other myopic eyes which have been examined a similar absence of these fibres has not been found.

The choroid is thinner and is atrophied, showing occasional patches of cellular proliferation at certain points and cicatrices at others; there is accumulation of pigment at some places while elsewhere it is entirely absent; particularly is this seen in the neighbourhood of the papilla. The *ora serrata* was found to be displaced backwards. In the retina little of particular moment was found, excepting some exudation outside the cone layer near the macula, with accumulation of pigmentary debris. In the region of the papilla the effect of the traction on the coats of the eye was to produce a complete disappearance of the external retinal layers, only the inner layer, much altered, extending up to the optic disc.

The optic nerve presented a peculiar form of atrophy, consisting in the formation of cavities surrounded by condensed neuroglia; a similar type of atrophy is occasionally seen in cases of glaucoma. A not unusual occurrence in cases of myopia was also found here, consisting of opacity in the posterior layers of the lens substance, with formation of vacuoles.

The author, in his final summary of this article, ascribes all the foregoing changes to the increase in size of the posterior segment of the globe, and inclines to the belief which ascribes the occurrence of myopia to congenital weakness in the posterior segment of the sclera, which favours such a condition of distension under certain causative conditions.

KENNETH SCOTT.

NEESE (Kief). **Two Cases of Intra-ocular Tumour in Shrunken Eyes.** *Klinische Monatsblätter für Augenheilkunde*, November, 1906.

I. *Glioma with Phthisis Bulbi.*

A child, aged eighteen months, was first seen in February, 1901. The left eye was shrunken, with the lids partly closed; the tension was diminished. Some blood was seen in the anterior chamber. The pupil under atropine showed two posterior synechiæ. Behind the lens in the anterior part of the vitreous was seen a yellowish-white mass with minute blood vessels on its surface. The child was pale, slightly comatose, with retracted head, pulse quick, and temperature slightly raised. Three children in the house had had influenza recently.

The diagnosis lay between glioma and "pseudo-glioma," and as the tension a few days later had increased, enucleation was advised, but refused. Four months later a fresh attack of inflammation occurred in the eye. The case was kept under observation and eight months after the first consultation excision was performed. The eye measured 18 m.m. \times 16 m.m., and on division was found to be filled with a whitish growth.

Microscopically the tumour was found to consist of a delicate network of connective tissue with many new blood-vessels, some of which were obliterated. In the meshes of this supporting tissue were innumerable small round cells with large nuclei and a few larger cells. The outlying portions of the growth were necrotic. The iris was more or less incorporated in the growth, and covered superficially by a delicate sheet of inflammatory connective tissue. The choroid was three times as thick as normal. The optic nerve was infiltrated with the cells of the growth, and the retina was indistinguishable.

Neese claims that from his description it is evident that the case is one of glioma of the retina with consecutive phthisis bulbi. The type of cell, the large nucleus with small amount of protoplasm, is, in his opinion, characteristic.

II. *Necrotic Alveolar Uveal Growth with Subsequent Atrophy of the Eye.*

In the early part of 1897 an aged woman was seen with the left eye enormously enlarged and protruding from the orbit; the conjunctiva was œdematous and the tension of the globe much increased. Through the dilated pupil could be seen a

yellowish reflex from the fundus. Dr. Mandelstamm, whose patient she was, advised enucleation, as he considered the case to be of malignant new growth.

The patient had had her right breast removed six years previously for cancer. The patient refused to allow the eye to be excised; subsequently an orbital abscess developed, which was opened twice. After the acute symptoms had subsided the eye slowly atrophied. The cornea became dull and covered with vessels. Six months after the first consultation the patient had another attack of pain with exophthalmos and tension of +3; the attack passed off and the shrinking continued. Nineteen months later another recurrence took place, and from this time the intervals between the attacks became shorter and the eye smaller, until at last, in January, 1900, three years after the first symptoms, enucleation was performed. The patient remained well for six months, then suddenly the sight of the other eye was lost. On examination the fundus showed the typical picture of choked disc. Three metastatic nodules were found on the skull, forehead, and sternum. Three months later the patient died.

On dividing the eye a tumour was found springing from the choroid and occupying the whole of the vitreous cavity.

Microscopical examination showed a compact connective tissue matrix formed in bundles and enclosing spaces of varying sizes. These spaces contained masses of epithelioid cells with large oval nuclei. The cells were irregular and generally circular, but in places columnar. The columnar cells were found chiefly in the periphery, and were arranged in long concentric rows. In the lower part of the growth were seen many pigmented spindle-shaped cells, and pigment cells were also seen among the connective tissue cells. The blood-vessels were small capillaries lying in the connective tissue stroma. Portions of the tumour were necrotic.

Neese considered that the tumour was an alveolar sarcoma with some melanotic characters. The question arises as to whether it was secondary to the tumour of the breast removed six years previously. On looking up the records it was found that the breast tumour was a proliferating cystic sarcoma.

No microscopic examination, however, had been undertaken, the macroscopic appearances at the time being considered sufficient. As there was nothing in the eye tumour to suggest that it might have been secondary to a tumour of the breast the author is inclined to consider that it may also have been a

primary growth, more especially as six years had elapsed after the removal of the breast before there was any manifestation in the eye.

With regard to the alternating glaucoma and phthisis bulbi in these cases, the former is no doubt due to the rapid increase in the growth of the tumour; the excessive pressure causes interference with the circulation and the cells die from want of nutrition, the tension comes down and resorption of the necrotic products takes place with consecutive cyclitis and phthisis bulbi.

Leber believes that the condition is possibly an infective one due to the invasion of micro-organisms. In both of these cases a careful investigation for micro-organisms was made with negative result.

Leber and Krahnstöver have taught us that in phthisis bulbi the possibility of the presence of a malignant tumour, either primary or secondary, must always be considered.

In conclusion, the author gives a careful résumé of the literature on the subject, and draws especial attention to Schipp's case, where secondary atrophy took place in the eye without any necrosis of the tumour.

E. W. BREWERTON.

A. SIEGRIST (Bern). **The Injuries of the Eyes and their Treatment.** *Correspondenz-Blatt für Schweizer Aerzte*, November 15th, 1906.

THIS paper, written for a medico-chirurgical society, contains a helpful summary of present-day methods of treatment of foreign bodies in the eye and of perforating wounds. In such conditions the more one makes use of general surgical principles the better, and to this end asepsis and rest and protection are all-important. For the removal of foreign bodies, composed of iron, from the interior of the eye, the author commends the electro-magnet of Mellinger-Klingelfuss, rather than that of Haab, in which the necessity for the close approach of the patient's eye to the pointed pole of the magnet is a disadvantage, on account of its not always being easy, and also because an injury of the cornea may be thereby produced.

A prolapsed iris or portion of vitreous should be reposed,

only if it has no sign of bruising or other lesion. If such injury is present the prolapsed part should be drawn out and abscised with scissors.

Where infection has occurred, or seems likely to occur, the surgeon must direct all his energies to overcome it. Yet there is no means in use at present that promises much success. Such as are used may be comprised under the headings of local and general means; of the former there are four, namely:—

1. Destruction of the infected edges of the wound, and of the infected vitreous, with the thermocautery, or the radical removal of the infiltrated edges with knife and scissors. This is of indisputable value; but it is often difficult to say with certainty that the vitreous is infected, or if it is, whether the infection is local or diffuse.

2. Sub-conjunctival injections of sublimate 1 to 2000, of oxycyanide of mercury 1 to 2000 or 5000, or of sodium chloride 3 to 5 per cent. These solutions act not as antiseptics but simply as lymphagogues, and their effect is got by changes in the circulation of the eye and in the secretion of the ocular humours. In view of this one must avoid solutions that may be too corrosive, for the tissues may be injured and their activity in the struggle against infection thereby diminished. Common salt solution (4 per cent.) is therefore the most suitable.

3. Repeated punctures of the anterior chamber. The aqueous humour thus allowed to flow off carries with it bacteria and toxins which are often present, and in addition the intra-ocular pressure is diminished and the circulation improved. One may also wash out the anterior chamber with an antiseptic fluid, but such fluid must of course be only weakly disinfectant, lest the delicate tissue be injured.

4. Intra-ocular disinfection with iodoform. This is done by the introduction, through a corneal or scleral incision, of a specially prepared rod or platelet of iodoform, into the aqueous or the vitreous cavity (Sidler-Huguenin's rod is the best). Though this plan has not been followed by any very remarkable success, Siegrist recommends it as of distinct use. Perhaps iodoform attacks only certain bacteria under certain conditions; these limitations might be with advantage inquired into.

Finally, the general treatment of infected wounds consists in the free administration of mercury, especially by inunction or intra-muscularly, and of large doses of potassium iodide.

THIÉBAULT (Algiers). **Notes and Observations on the Employment of Radium (Epithelioma, Scleritis, Trachoma).** *La Clinique Ophtalmologique*, xii., 23.

DR. THIÉBAULT describes in his interesting paper two cases of epithelioma which he treated by the application of radium; in the first one, which was far advanced, the march of the process was unfortunately not arrested, but was considerably checked by the treatment; in the second, an epithelioma of the face 7 m.m. in diameter with enlarged pre-auricular glands, a cure was effected after eight applications of thirty minutes each, given at intervals of one week. A patient with episcleritis in both eyes was completely cured after three applications to the one eye and four to the other, each of three minutes' duration. A case of old diffuse scleritis benefited much from radium treatment, the vision also being notably improved. Thiébault has employed radium extensively in trachoma, with gratifying results both in curing the disease and in clearing the cornea where pannus was present. He has recently employed the same treatment in a patient with atonic ulcers of the corneal limbus, and is favourably impressed with its action. Thiébault holds that radium in ocular therapeutics has a great future before it, and that in it we shall possess a powerful means of combating many affections.

E. M. LITHGOW.

A. MAITLAND RAMSAY (Glasgow). **Injuries to the Eye and their Treatment.** Glasgow: Maclehose and Sons.

THIS is an elegant book, in admirable type, on sumptuous paper, and with numerous beautifully executed drawings reproduced with great skill! The author discourses in a pleasant easy way about his subject, and shows himself at every turn a painstaking and conscientious practitioner. He tilts at the tendency—which we admit to exist—on the part of the junior profession to neglect the old-fashioned regard which was formerly had to the value of internal treatment and of the knowledge of the patient's "constitution," and confesses himself, intentionally and unintentionally, as a little prone to err in the opposite direction. His book is hardly addressed to the specialist, one would think, from its style,—rather it is calculated to attract the general practitioner, and mildly to instruct him in the wily ways of the surgeon, at whose control are all the apparatus and facilities of a large hospital.

TRUC and PANSIER. **History of Ophthalmology in France.**
Paris: Maloine, 1907.

As a contribution to this interesting subject the two authors publish a record of the history of ophthalmology at the Medical School of Montpellier from the twelfth to the twentieth century. The details are not of any very vital or immediate importance to most of the readers of the *Ophthalmic Review*, but we can all admire the piety of those who, being now teachers in that famous school, have devoted so much time to the study, and displayed so much interest in the investigation of the condition of affairs in former days, and in the presentation of the chief occurrences in the lives of their predecessors in their important office of teacher of ophthalmology at Montpellier.

G. HARTRIDGE (London). **Refraction of the Eye.** Fourteenth Edition. London: J. and A. Churchill.

AMONG many competitors this book preserves its high place as an essentially "sane" guide to the examination of the refraction. It makes no claim to be ultra-scientific, it makes no mysteries out of simple procedures; it is plain, matter-of-fact, able to be understood of the people. That it continues to be popular is evident from the fact that it is now in its fourteenth edition, the previous one (of 3,000 copies) having become exhausted in eighteen months.

A. POLACK. **Retinal Functions in a Case of Congenital Amblyopia.** *Revue Gen. d'Ophthalmologie*, December, 1906.

By the term congenital amblyopia is here meant that defect of visual acuity dating from earliest infancy, which cannot be accounted for by any anomaly of refraction, nor by any lesion apparent to ophthalmoscopic examination; it is functional in its character, and occurs in varying degree, and, so far, its cause remains undefined.

The principal symptom is deficiency in the general standard of vision. In addition to this there are other peculiarities which have been recorded at various times, such as contraction of the visual field, colour blindness, central scotoma.

In 1866 Charpentier noted twenty cases of this condition amongst one thousand eye-patients; and since then attention has been drawn to similar instances from time to time, the proportionate frequency of their occurrence being variously stated by different observers.

Opinion has been much divided as to the nature of the cause, and no substantial hypothesis has yet been reached. It is on this account that the author has made a close study of the present case, and has particularly directed his attention to ascertaining the following two points:—

1. Whether this congenital amblyopia is confined to the posterior pole of the eye, or whether it involves other portions of the retina as well?

2. Whether the visual acuity only is defective, or whether there are other functions of the retina equally implicated?

In June, 1905, the eyes of a lady artist (student) were examined by him; she was unmarried, aged 26; the right eye had normal vision, and the left eye could only count fingers at 2 metres. This left eye showed only a very slight degree of astigmatism, the correction of which brought about no improvement; no alteration was apparent in the fundus or other parts of the eye. In both eyes the pupil reflexes were normal, also the fields for colour-vision, as well as the power of accommodation; there was no abnormality present in the extrinsic muscles of the globe, and a photograph taken when the subject was five years old showed the eyes to be in correct position. Vision with the left eye had never been good.

The father of the patient died at the age of 49, of acute phthisis, the mother at 50, of paralysis. Of seven children composing the family, two died early, and of the surviving five members both this lady and one of her brothers had an amblyopic left eye. The brother had squinted during childhood, but the deviation had now disappeared.

The patient possessed keen powers of observation, and had found that, notwithstanding the defect in her left eye, it was of much use to her in her work of painting.

In the examination of the eyes (the left one always being taken first), both the central and peripheral vision was minutely examined, and particular attention was directed to:

1. Visual acuity, direct and peripheral.
2. Light-sense and colour-sense.
3. Adaptiveness of the retina.
4. Persistence of retinal impressions.

5. Secondary images (successive contrast-vision).

6. Entoptic sensations of vision.

Careful estimation by suitable means showed that the direct visual acuity of the left eye was forty times feebler than in the other eye; but outside an area extending about 10° from the centre, the vision, when examined in the successive circles of the field until the peripheral limit was reached, was found to be identical and equally good in both the eyes.

The light sense was examined by the photometer, the smallest appreciable amount of light being first ascertained, then the minimum necessary for the distinction of colours. The tests were made under varying conditions of adaptation of the eye for complete or partial darkness. In both eyes it was found that the response of the retina in each of these directions was quite normal. The colour-perception of both eyes was highly developed, and it was remarkable that it was, if anything, better developed and more extensive, especially towards the outer periphery, in the defective than in the sound eye.

The persistence of retinal impressions was tested by an ingenious apparatus of the author's own devising; the two eyes proved to be exactly equal in this respect.

In order to test for secondary impressions the retina was fatigued by the eyes being made to gaze steadily at a well-illuminated coloured surface, and then a white surface was quickly superimposed, without the eyes moving at all, in order to evoke the impression of the consequent complementary colour. The sensations produced were absolutely identical in the two eyes. The test was particularly interesting when made with a violet-blue for the fatigue-producing colour. The secondary impression was that of an orange-yellow field with a greenish-yellow spot at its centre, of a lighter tint than the surrounding field, obviously the entoptic perception of the macula.

The result of this and similar tests leads the author to the conclusion that there was in this case *no central scotoma*. A conclusion so much at variance with that of other observers of similar cases leads one to enquire what is the author's criterion of the existence of a scotoma. He says: "I consider that there is a central scotoma, relative or absolute, when the luminous and chromatic sensibilities are dulled or abolished at the centre of the retina. But when these retinal sensibilities remain intact at the posterior pole of the eye, and there is nothing

but a diminution of the visual acuity, there is no central scotoma." The difference, therefore, appears to be one rather of terms than of facts. At any rate, such cases are worth the careful investigation which the author has bestowed on this one, for the cause of the condition still awaits solution.

KENNETH SCOTT.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

February 14th, at 8 p.m.

Vice-President, Mr. R. W. DOYNE, in the chair.

Paralysis of the Vertical Movements of both Eyes; ?Hæmorrhage about the Corpora Quadrigemina.—Mr. Ludford Cooper.

This patient was a man, who was quite well till March 14th, 1906, when at 4 a.m. his wife noticed that he was breathing very heavily, and he was found to be unconscious with flushed face and no corneal reflex; these symptoms disappeared in the afternoon when he regained consciousness. On March 16th he was sitting up, but his manner was excitable and his speech rambling. The pupils were equal and acted well; the movement upwards was deficient in both eyes, and all reflex movements of the eyes were lost; there was no diplopia, and both fundi were normal. Kneejerks were absent. No history of syphilis.

He was admitted to the Hospital at Rochester on April 3rd, 1906, when his mental condition was much improved. The ocular muscles showed the same defect as before. The vision, with correction, was normal in each eye, and the fields were full. The reflex movements of the eyes showed signs of returning. On April 25th and on April 30th, there was free movement vertically when fixing an object, but voluntary movements were completely absent.

Siderosis of the Eyeball.—Mr. A. Stanford Morton.

John W., aged 54, was admitted to the Royal London Ophthalmic Hospital, in December 1906, with the history that 2 years ago he was breaking stones with a hammer when something flew up and struck his right eye; the sight was affected immediately afterwards. During the succeeding week he had some pain and lachrimation, and attended the Bedford Hospital. One month later the sight of the left eye began to fail, so that 3 months afterwards he was unable to find his way about the Hospital unaided.

On examination a small scar was found near the outer margin of the right cornea, the iris was a greenish grey colour with a small opening in its structure opposite the corneal scar; the pupil was dilated and inactive to light; lens clear.

The fundus appeared atrophic and of a slightly yellowish hue; there was advanced disease of the retinal vessels, much more pronounced in the arteries than in the veins, which were thickened. There was some atrophy of the retina with numerous more or less angular masses of brown material, outlined by white, lying in it. Downwards and outwards from the disc was a sharply defined foreign body surrounded by altered blood-clot. The eye had barely perception of light.

The left pupil was inactive to light, but acted with convergence. There was no iritis nor old cyclitis. The optic disc was atrophic, the retinal vessels reduced in size, and the veins bordered with white lines; the vision was only perception of hand movements.

There was no evidence of changes in the central nervous system.

A Case of Polycoria associated with Chronic Glaucoma.—Mr. Malcolm L. Hepburn.

Geo. C., aged 61, came to the London Hospital early in January 1907, under the care of Mr. Lister. He complained of dimness of sight which he had noticed for the last 8 weeks, though for the last 3 years he had observed occasionally coloured rings round lights. There was no pain, and no other subjective symptoms, nor was there anything wrong with the eye before, with the exception of the peculiar appearance of the iris, which he states had existed since birth.

R.V. $\frac{6}{36}$, no H.M.; L.V. $\frac{6}{18}$, with +1D sph. = $\frac{6}{6}$ pt.

The left eye was normal in every respect. The right eye showed a complete oval-shaped pupil, placed down and in, which reacted to light; the part between the pupil and the periphery was made up of 5 triangular bands, the broadest being situated downwards and inwards, enclosing between them clear spaces through which the fundus could be plainly seen. In addition to these bands, there was also an almost complete ring of pigmented tissue situated at the angle of the anterior chamber, less marked above, and on the outer side this appeared to be in contact with the posterior surface of the cornea. On the outer side, too, behind this rudimentary stump of tissue, was a large mass of pigment into which passed some of the fibres belonging to the septum beneath which it was situated. The patient states that the pupil was originally central. The fundus showed typical glaucomatous cupping, the field was contracted, especially on the nasal side, and the tension was +1.

Two explanations of the abnormality in the iris suggest themselves;

one is that the iris was originally complete, but that by process of inflammation or atrophy, spaces were formed in the iris tissue; the other is that faulty development accounts for the defect. The latter explanation is probably the true one, but we must assume that the iris was developed from a number of separate processes of mesoblastic tissue growing forwards between the lens and the posterior surface of the cornea, which coalesced to form the pupil.

As regards the occurrence of glaucoma in these cases, somewhat similar cases have been met with where the same condition has supervened in subjects with aniridia. The whole subject has been discussed by Mr. Teacher Collins (*v. Transactions of the Ophthalmological Society*, vol. xiii., p. 128, and *Ophthalmic Review*, vol. x., p. 101). Six cases are there described, three of which were of traumatic origin, and four were subjected to microscopical examination, and it was shown that the glaucoma is always produced by the blocking of the angle by the stump of rudimentary iris. It is possible that the actual cause of the glaucoma in this case was the blocking of the angle by the rudimentary stump of pigmented tissue which was seen at one part to be in contact with the back of the cornea, and that the various septa had very little to do with occurrence of increased tension.

In the discussion which followed on this case, Mr. Lister mentioned the various groups already met with into which this class of abnormality might be divided, and Mr. Treacher Collins suggested that the abnormality of the iris might be explained by loops of blood-vessels pushing themselves forwards in the developmental stage, some of which failed to continue their progress, and thus caused gaps between the other fully-formed septa. The only treatment suggested of an operative nature was an anterior sclerotomy.

Case of Tuberculosis diagnosed from the Ophthalmoscopic appearance of the Fundus.—Mr. Warren Tay.

This was a description relating to a child who came under the care of Dr. Semple at the North-Eastern Hospital for Children in 1884, and which Mr. Warren Tay saw.

Dr. Semple recorded the case in the *Medical Press and Circular* in 1885, and a sketch was published in the *Transactions of the Ophthalmological Society*, 1885, in a series of cases described by Mr. Lawford.

There was a history of 4 months' illness; and the child was first treated for acute nephritis, 3 months later it had hemiplegia and aphasia, and 14 days afterwards there was pain in the head which increased in severity, and the child became apathetic, anæmic and drowsy, was admitted to the Hospital on November 17th, 1884, and died on the 28th.

Chorio-vaginal Vein in a Myope.—Mr. George W. Thompson.

M.S., aged 17, was seen in February 1902.

$$\text{R.V. } \frac{-20 \text{ sph}}{-2 \text{ cyl}} = \frac{6}{18} \quad \text{L. } -22\text{D} = \frac{6}{24}.$$

The left eye was needled twice; and on January 10th, 1903,

$$\text{L.V. } \frac{6}{12}; \quad c - .5 = \frac{6}{9} \text{ pt.}$$

In the fundus of the left eye was seen a broad vein beginning in a few branches between the macula and the optic disc, it then looped down by the superior temporal vessels, and suddenly dropping backwards disappeared from view.

In the subsequent discussion in connection with this case, Mr. Coats and Mr. Treacher Collins pointed out that, inasmuch as the vein did not take the usual course of a chorio-vaginal vessel, viz., from the posterior pole towards the optic nerve, passing thence down into the sheath of the nerve, it could be hardly regarded as a vessel of that character; but it was rather a posterior vortex vein running a somewhat abnormal course.

Hyaloid Artery partially Patent, associated with Remains of Posterior Fibro-vascular Sheath, and Ciliary Processes on the Posterior Surface of the Lens.—Mr. George W. Thompson.

This was the case where the patient's right eye, the vision of which was $\frac{6}{60}$, showed a partially patent hyaloid artery; the posterior third of its course was wavy and of darker colour, anteriorly it ended on the posterior surface of the lens as a white, non-vascular membrane. There were also seen 4 ciliary processes curling round the circumference of the lens, the upper two being much elongated and attached to the remains of the fibro-vascular sheath, the lower ones appeared to be fixed to the back of the lens.

A Retinoscopy Long-arm.—Mr. J. H. Tomlinson.

This was a device by which lenses could be mounted on a long handle, and in this manner held in front of a child's eye so as to conduct the retinoscopy at a convenient distance. It was claimed that the refraction could thus be more easily performed in the case of children than by the usual methods as the mother could also assist by adjusting the end containing the lens so that it should be always in contact with the child's face.

A Case of Detachment of the Retina in which Recovery followed Scleral Puncture.—Mr. W. H. McMullen.

E.G.H., male, aged 37, was first seen on August 27th, 1906, when he complained of defective vision in the right eye which came on suddenly

one week previously; there was no history of injury, but he had always been shortsighted and had worn glasses for 10 years. Two days before losing his sight he had noticed some specks in front of the right eye.

R.V., barely counts fingers at 25 c.m.

L.V., $\frac{6}{60}$, with -4.5 sph. = $\frac{6}{6}$.

A chart of the field of vision at this time revealed a large defect at the lower and inner part, including the fixation point; this corresponded with an extensive detachment of the retina seen with the ophthalmoscope upwards and outwards, best focussed with a $+8$, the rest of the fundus being visible with -4 . The eye was bandaged; and on September 4th, after one week's rest, injections of pilocarpine were administered, but with no improvement in the condition. Scleral puncture was then resorted to between the superior and external rectus, as far back as possible; the Graefe's knife was introduced only 2—3 mm. A pressure bandage applied to both eyes. The next day the detachment had quite disappeared, but ten days later the patient had to be removed from the Hospital, and the journey caused a recurrence so that on September 16th the scleral puncture was repeated, with the result that on the following day there was nothing to be seen of the detachment, only a whitish area, slightly pigmented, situated upwards and outwards. Rest on the back with both eyes bandaged was the treatment for 2 months; and at the end of that time the vision with -3.5 sphere was $\frac{6}{18}$.

A Case of Neuro-retinitis.—Mr. G. H. Pooley.

N.D., aged 20, came for advice because the vision in the left eye had failed suddenly 2 months ago, and returned 2 or 3 days later.

On examination the pupils reacted to light, and the tension was normal.

R.V., $\frac{6}{6}$ H.M. + .75D. L.V., Hand movements.

By the ophthalmoscope, the left disc was seen to be pale, and raised above the level of the rest of the fundus to the extent of one millimeter; it occupied the central part of a raised cone which extended as far as the mid-point between the disc and the macula. There were also some typical neuro-retinitic changes at the macula, and at the periphery the retina was pale with some spots of exudate and streaks of pigment. The retinal vessels were very small. The right fundus showed a pale disc and small vessels but no swelling; there was a V-shaped unpigmented patch in a highly pigmented area at the macula; and in the periphery there was much the same condition as in the left eye but less marked. There was nothing definite in the general health beyond some chlorosis with hæmic murmur.

MALCOLM L. HEPBURN.

A HISTOLOGICAL STUDY OF THE NORMAL HEALING OF WOUNDS AFTER CATARACT EXTRACTION.

By THOMSON HENDERSON, M.D., Nottingham.

THE healing of cataract wounds is a matter of such prime importance to ophthalmic surgeons that clinically this aspect of the subject has always received the due attention its importance has merited. From a histological standpoint, however, the study of the reparative changes has not been so complete, owing to such an investigation being beset by difficulties, not only on account of the complex nature of the processes involved, but also because material for such a research is naturally difficult to obtain—rendering accounts published incomplete from insufficiency of data.

The following paper is based on a microscopic examination of thirty-three aphakic eyes. In all these the clinical process of healing was progressing or had progressed in a perfectly normal manner. In twenty-one of these cases death supervened, from some intercurrent affection, in a period varying from three days to a month after the date of operation; in four the eyes were enucleated for pain and secondary glaucoma; while eight specimens were obtained from the *post-mortem* room. As regards the method of operative procedure in the series—fifteen were operated on after the modern flap operation with iridectomy, four were cases of simple extraction, while thirteen had been operated after Graefe's method, and one is an example of Jäger's linear incision made with a hollow ground concave knife.

THE INCISION.

Before Graefe's time the operation of extraction was performed by means of a corneal flap incision, upon the

lines of Daviel's classic operation. Graefe, however, in that operation which bears his name, so modified it in form and position that the section came to lie altogether in the sclera. The modern incision may be described as a compromise between these two extremes, for while in form it is a circular flap, in position it lies in the corneo-scleral junction.

The external relations of the incision, which, as will be later demonstrated, are of the utmost importance in the subsequent processes of healing, are given as follows by two eminent authorities:—(1) "The incision between puncture and counter-puncture lies in the clear cornea at its very margin" (Swanzy); (2) "the section divides the cornea just in the limbus" (Fuchs). That is to say, in the former case the incision lies altogether in the cornea, while in the latter the section goes through the sub-conjunctival tissue and conjunctiva of the limbus, and necessarily comprises a conjunctival flap.

The internal relations of the section at the centre of the coloboma show that the distance of this end of the incision from the *posterior* end of Schlemm's canal (taken as the nearest fixed point and one which practically can be considered as equal to the angle of the anterior chamber) varies from 2.66 m.m. to 1.54 m.m. (*vide* table). In the case of the much more peripheral Graefe's linear incision the distance is much less, being from 1.82 m.m. to as little as 0.36 m.m.

The plane and direction of the incision vary very much in different cases, and in fact in different parts of the same case. The first part of the incision, *i.e.*, puncture and counter-puncture, runs parallel to the iris plane; but owing to the different factors that come into play when the incision is being completed, the obliquity of the section

through the cornea varies; depending on where the incision is finished and how the knife is brought out.

In Graefe's section, in consequence of its method of formation and peripheral position, the centre of the incision tends to be perpendicular to the surface. An important point to be noted in considering the plane and direction of the incision is *the relation of the cut surfaces to each other*. As is well known, an experimental vertical incision through the cornea is followed by a greater retraction of the anterior and posterior than of the central corneal layers, so that the margins of the wounds, instead of appearing as straight lines, show two curved surfaces, meeting and touching at the middle, giving the appearance of two triangular spaces with bases respectively in and out.

In extraction wounds this appearance, while present, is modified and not so evident, on account of the nature and position of the incision. Irregularities and unevenness of the opposing surfaces are not uncommon in consequence of the sawing motion with which sections are often completed, giving the wound track a notched, waving or step-like appearance. Besides this retraction there is also to be found—clinically as well as histologically—a tendency for the central or corneal flap to spring forward and overlap or override the scleral, resulting in further gaping. To account for this displacement of the flaps various explanations have been suggested, such as the pressure of the lids, the action of the extra-ocular muscles and the intra-ocular tension within the anterior chamber (Jackson¹¹). Now, whatever may be the influence of the first two suggested causes, a microscopic study of a series of cases in the process of healing will show that the last can certainly play no part, because not only is mediate union of the wound absolutely inadequate to withstand such a

strain as is suggested would cause the displacement of the corneal flap, but also this displacement is equally well marked in three cases where a corneal fistula had formed, and where therefore the pressure in the anterior chamber must have been at a minimum. An adequate explanation is to be found in the extensive incision, occupying as it does a third of the corneal circumference, freeing the corneal lamellæ from their state of normal tension and so allowing the corneal flap to spring forward, this being most marked, as might be expected, at the centre of the wound. The oblique course of the incision facilitates this, for where the section runs perpendicular to the surface, as is the rule in Graefe's operation, this displacement does not readily take place, owing to the inability of the margins of the wound to glide past each other. The influence of such displacement in the subsequent process of healing and its bearing on the production of post-operative astigmatism will be discussed later.

HEALING OF THE WOUND.

The importance of the position of the incision in producing modifications in the subsequent processes of healing first requires emphasis, and a sharp and clear distinction must be drawn between sections lying in the clear cornea and those in the sclera or corneo-scleral junction. In the former class the type of healing is similar to that following a simple perforating corneal wound. In the latter class, where the section lies in the limbus the healing process is modified by the important rôle that the subconjunctival tissue plays.

The process of repair in a corneal wound, whatever its position, may be divided into three stages—(1) mediate

union; (2) primary union; (3) permanent union and cicatrisation, which last is a stage that takes a much longer time to accomplish than is generally thought.

A. CORNEAL INCISION.

Mediate union is here brought about by a fibrinous exudate, which glues the margins of the wound together at that point where the distance between them is least, *i.e.*, about the centre. This fibrinous plug is sufficient to retain the aqueous and allow of the restoration of anterior chamber. Whether this coagulum is a transudation from the severed corneal lamellæ or a deposit of the newly-exuded aqueous is a point that has not yet been definitely settled. It has, however, been proved that after a paracentesis the aqueous contains albumin and fibrin, neither of which constituents is present normally. That the fibrinous plug is chiefly, if not altogether, a derivative of the altered aqueous is also shown by experimental non-perforating wounds in which the cut surfaces show little or no fibrinous deposit.

Primary union. This stage in the process of healing is effected by the surface epithelium and the posterior endothelium. These layers proliferate and grow down the respective margins of the incision till they meet and cover not only the lips of the wound, but also the fibrinous plug that brought about mediate union. (Figs. I., II. and III.)

Since Gutterbock²⁵ first pointed out the important rôle that the surface epithelium plays in the closing of corneal wounds a great deal of experimental work has been done, especially by Neese,²³ Peters^{30, 31} and Ranvier.¹⁸ Neese studied this epithelial down-growth in rabbits, and found an hour after an incision numerous mitotic figures present in the epithelium surrounding the wound. Peters, how-

ever, failed to make out the early and marked karyo-kinesis described by Neese, and points out that many more cells lie in the lips of the wound than can be accounted for by mere cell division of the surrounding epithelium. He considers that the epithelial cells which first cover a break in the continuity of the epithelial layer, get there by active amœboid movement, and not till after this active immigration of cells does the factor of cell division come into force.

Ranvier agrees with Peters that proliferation of the epithelium at first plays an unimportant part, as mitotic figures are absent, or few in number and late in appearing. He believes, however, that the in-dipping is quite a mechanical process, following as the result of the epithelial cells lying normally under a certain tension—"like balls in a sack"—so that when the mutual support is withdrawn by the incision, the cells fall into the wound. This is disproved by Peters' further researches on the behaviour of the posterior endothelium.

In the cases examined observation on cell division was precluded, owing to the specimens having been hardened in Müller's fluid.

The surface epithelium descends into the external margins of the wound as two stratified epithelial layers, and when, owing to the fibrinous plug barring the way or the corneal lamellæ being in contact, the two epithelial layers meet, the gap on the external aspect of the wound is eventually filled by a solid epithelial plug, the product of the continued activity of the epithelial cells. (Fig. III.)

It is not to be expected that after extraction this epithelial down-growth is anything like as rapid a process as in young rabbits on whom the observers cited above made their observations. There is, however, in man a

marked difference to be noted in individual cases as regards the rate at which the epithelium comes to cover the depth of the wound. This would appear to take two to three days, but in equally uncomplicated cases it can be delayed much longer and an exactly similar stage not arrived at till a fortnight or even longer after operation. This disparity in the rate of formation of the epithelial covering and production of an epithelial plug must be ascribed to the personal factor of the vital activity of the tissues in different cases.

When through excessive gaping or failure of the fibrin plug to form mediate union, the way lies open, the corneal epithelium will make its way into the anterior chamber unhindered. This has occurred in four cases of the series. In two the stratified epithelium has just rounded the internal lips of the wound. In the first this had only taken three days to accomplish, while in the second it had taken twenty-seven days to advance an exactly similar distance. The other two cases illustrate the serious, in fact disastrous, consequences of the continued progress in the anterior chamber of this epithelium, which had made its way along the posterior surface of the cornea, covered the surface of the iris and blocked the angle of the anterior chamber, resulting in pain and increase of tension, for which the eyes were enucleated, respectively four and five years after what at first had been most successful operations.

While the stratified epithelium on the surface of the cornea is descending into the outer extent of the wound, the endothelium on the posterior surface by a similar process lines the inner aspect of the incision, to the completion of primary union.

Peters points out that as regards the regenerative

processes there is complete accord between the single layer on the posterior aspect and the stratified epithelium covering the surface of the cornea. In both there are two regenerative processes following on each other; first, a provisional covering following as the result of active and amoeboid movement of the surrounding cells, and, secondly, a permanent covering derived from cell division.

Primary union in a corneal flap incision is therefore completed without the parenchyma playing any part in it whatsoever, and, judging from the series of cases examined it is certainly not till the sixteenth day that the corneal elements proper manifest any active sign of reparative activity, that is, not before the average patient in this country is discharged from hospital.

Permanent union is brought about by a slow and gradual growth of the corneal fibres, and these by their pressure on the epithelial plug cause it to atrophy and finally to disappear entirely. The interspace between the two cut surfaces is thus reduced to a vanishing point, so that the normal radius of curvature of the cornea is restored. Firm and permanent cicatrisation is not accomplished for two, three or more months, but when completed it is the exclusive product of the corneal parenchyma, with a course which it is scarcely possible to follow in its entirety.

B. LIMBAL INCISION.

In limbal or scleral incisions the process of healing is altogether modified and altered. This is owing to the important part played by the limbal and sub-conjunctival tissues. There is here the same tendency for the retraction of the superficial and deep parts of the incision along with

the forward displacement of the corneal flap described as occurring in incisions in the clear cornea.

Mediate union follows the formation of a fibrinous plug in exactly the same way as described above as occurring in purely corneal wounds. The conjunctival or limbal flap here present becomes by the same process agglutinated, preventing the surface epithelium from descending into the wound track and taking any part in the second stage.

Primary union is here brought about by a down-growth of the sub-conjunctival tissue, especially from that of the more distant or scleral flap. (Figs. V. and VI.) As overlapping and gaping is most marked at the centre of the wound, it is here that the greatest amount of sub-conjunctival growth will be found. It does not appear to be till after the third day—to judge from the cases of that date in the series—that any attempt is made by the sub-conjunctival tissue to grow down between the lips of the incision, the regenerative process being possibly delayed by the œdematous swelling of the tissues. By the seventh day, however, primary union is well advanced, as the newly-formed connective-tissue cells have by then pushed their way well down both surfaces of the wound. New-formed blood-vessels are to be seen clinically in the limbus, and are likewise to be discovered histologically making their way down with the connective-tissue down-growth. In consequence of this origin the cells forming this down-growth at first lie with their long axes parallel to the wound, and therefore perpendicular to the surface. This appearance is as characteristic of the stage of primary union in an incision lying in the limbus or corneo-sclera as is the formation of an epithelial plug in the purely corneal wound, and lasts apparently unaltered till the end of the third or fourth week; at any rate the

only difference then apparent is that by that time the posterior endothelium has bridged over the gap at the inner extremity of the incision.

Permanent union and cicatrisation is effected by a slow replacement of the connective-tissue cells of limbal origin by cells whose long axes now run parallel with the corneal lamellæ. (Fig. VIII.) The resulting cicatrix is broader and much more distinct than that following a purely corneal incision, and the fibres comprising it do not form the same thick regular lamellæ of the normal sclera, but run in finer bundles and in rather an irregular manner, so that the course of the cicatrix can always be made out throughout its extent.

The blood-vessels which made their way down along with the connective-tissue down-growth and which play such an important part in its nutrition, become in the subsequent contraction of the scar pressed upon and obliterated, though a few may still remain patent, while others may be seen as empty tubes in the course of the cicatrix.

The relative inactivity on the part of the sclera in the healing process must be ascribed not so much to a poor development of the power of reproduction by its cells, but rather to the absence of blood-vessels, so allowing the dominating formative action of the sub-conjunctival tissue, on account of its vascularity, to play a more important part in its regeneration, and thereby permitting the wound space being filled by a connective-tissue derived from other sources. For in those cases where, owing to good apposition and absence of gaping, the sub-conjunctival tissue is prevented from taking part in primary union, the wound becomes firmly healed by direct union without the inter-

position of any intercalary mass, though this is not a frequent occurrence in the modern flap operation.

As a counterpart to those cases where the surface epithelium in the corneal incisions had descended into the anterior chamber, one finds that, given the opportunity, the sub-conjunctival tissue in scleral sections will do likewise. Under normal circumstances the down-growth stops after having reached the inner margin of the incision, but where the anterior lens capsule has prolapsed into the wound the sub-conjunctival tissue makes its way along the capsular surfaces to form a mass in the angle and upper part of the anterior chamber. The fibrosis and subsequent contraction of this mass will tend, by closing the filtration angle, to bring about secondary glaucoma. All the six examples of capsular prolapse in the series were early cases—under a month—and with one exception had been operated on after Graefe's method. There was nothing stated in the clinical histories as regards any delay in healing.

DESCEMET'S MEMBRANE.

Descemet's membrane, as a purely passive structure derived from the cells of the posterior endothelium, has no recuperative power, hence sections through the membrane are always seen with sharp and clear cut surfaces, no matter how long after the operation. It was on this account at one time believed that Descemet's membrane was never reformed until Wagenmann showed how it was regenerated by the endothelial cells, which, as we have seen, creep along the margins of the wound, and in the course of time lay down a new layer which bridges over the space existing between the two cut ends of the original membrane.

Becker, in his "Atlas of Pathological Topography of the Eye," illustrates several extraction wounds in which in the upper or scleral segment Descemet's membrane projects beyond the cut scleral fibres, but he does not comment on the fact. I found a similar condition in 17 of the 33 cases examined, the amount varying from 0.05 to 0.35 m.m. This appearance undoubtedly depends directly on how the incision is formed, rather than on any contraction or retraction on the part of the membrane or corneal fibres, for it is always most pronounced the more oblique the course of the incision. In a few cases Descemet's membrane was found broken or stripped off for a short distance from one or both margins of the incision.

POST-OPERATIVE ASTIGMATISM.

One of the most important results directly bearing on the healing of extraction wounds is the production of post-operative astigmatism.

Donders, in 1864, first noted and described this acquired astigmatism as following in consequence of the cicatrix altering the curvature of the cornea. That the astigmatism directly follows upon the incision is a well-known clinical fact, though why it should result and from what causes are still disputed points.

The clinical facts established are :—

1. The axis of post-operative astigmatism is always dependent on the position of the incision, arising from a flattening of the cornea at right angles to the wound, accompanied by an increase of curvature parallel to it.

2. The more regular the cicatrization the less marked is the astigmatism. The influence of complications on the amount is considerable, and is proportional to the involve-

ment of the wound, so that an extensive incarceration of the iris is worse than a small prolapse.

3. It is said to be less after a linear incision with a keratome or after a Graefe's extraction than it is after a flap operation.

4. The astigmatism reaches its maximum very shortly after the operation, upon which it begins to diminish slowly till a permanent amount is reached, but the rate of diminution is not regular. Jackson ¹¹ states that in only 15 per cent. of extractions is a permanent amount of astigmatism reached by the second month; in 60 per cent. this is not reached under three months, while in 20 per cent. regressive changes are continued over three months.

To account for these manifestations and observations on post-operative astigmatism many theories have been put forward, but few facts.

When discussing the relationship of the wound surfaces to each other, it was stated that after extraction there was a great tendency for the central or corneal flap to spring forward and overlap the scleral margin. In this is to be found the primary cause of the subsequent astigmatism. The predisposing cause is to be found in the position of the incision, *i.e.*, whether corneal or limbal. In the former position of the wound the resulting gap between the two cut surfaces is finally reduced to a minimum, so that the normal radius of curvature of the cornea is restored. In the latter the interspace is filled by a connective-tissue down-growth which prevents complete apposition of the cut surfaces. In the subsequent cicatrization this interspace is diminished, but still the effect is that of a wedge introduced into the segment of a circle, resulting in an increase of the radius of the latter—otherwise a diminution of curvature in the vertical meridian.

In the cases examined the interspace present between the healed and united surfaces varied from nil to as much as 0·7 m.m.

The rôle that foreign matter, whatever its nature, plays when inclosed in the incision, is that by keeping the margins of the wound apart, it aids the descent of the limbal tissue, hence the clinical observation cited above, that the influence of a prolapse on the subsequent astigmatism is proportionate to the involvement, as an extensive incarceration is worse than a small prolapse owing to the surface influenced being greater.

In only one case of the series is there a note of the previous vision, which one year after the operation, with correcting glasses of 11 D. sph. \bar{c} 3 D. cyl., was $\frac{6}{18}$. The case was one of a corneal incision with incarceration of the inner pillar of the coloboma, in consequence of which the surface epithelium had descended into the anterior chamber and formed on the way a cyst between the wound surfaces, which was only discovered on microscopic examination. There can be no doubt that the astigmatism in this case was directly due to the cyst which here played the same part as a more solid intercalary mass.

While one case in itself carries little weight, yet a consideration of all the facts stated as to the various processes of healing after extraction can but lead to the conclusion that the cause of post-operative astigmatism rests on an anatomical basis and that the ultimate degree depends on the amount of the intercalary mass interposed between the cut surfaces.

In concluding, I wish to acknowledge my indebtedness and gratitude to Prof. Fuchs, not only for material, but also for much kind assistance and encouragement while working in his laboratory and clinic in Vienna.

TABLE OF CASES.

Case.	Period after Operation.	Distance of inner margin of incision from posterior end of Schlemm's canal.
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MODERN FLAP OPERATION:—

32 4 years 2·66 m.m.
9 13 days 2·23 „
2 3 days 2·17 „
23 Healed 2·2 „
1	..... 3 days	..... 2 „
25	..... Healed	..... 1·8 „
27	..... Healed	..... 1·8 „
5	..... 7 days	..... 1·75 „
26	..... Healed	..... 1·7 „
4	..... 6 days	..... 1·7 „
11	..... 14 days	..... 1·65 „
6	..... 7 days	..... 1·57 „
24	..... Healed	..... 1·54 „

GRAEFÉ'S INCISION:—

28	..... 4 years	..... 1·8 m.m.
29	..... Healed	..... 1·4 „
20	..... 9 days	..... 1·26 „
12	..... 15 days	..... 1·24 „
14	..... 20 days	..... 1 „
19	..... A month	..... 0·94 „
21	..... No history	..... 0·9 „
23	..... Healed	..... 0·9 „
7	..... 8 days	..... 0·8 „
16	..... 28 days	..... 0·78 „
15	..... 22 days	..... 0·74 „
8	..... 11 days	..... 0·64 „
30 No history 0·36 „

SIMPLE EXTRACTION:—

31 2 years 2·65 m.m.
10 13 days 2 „
13 16 days 1·5 „
17 27 days 1·5 „

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35. Stöwer. *v. Graefe's Archiv.*, xlvi.



FIG. 1.—Corneal Incision. 3 days after operation.

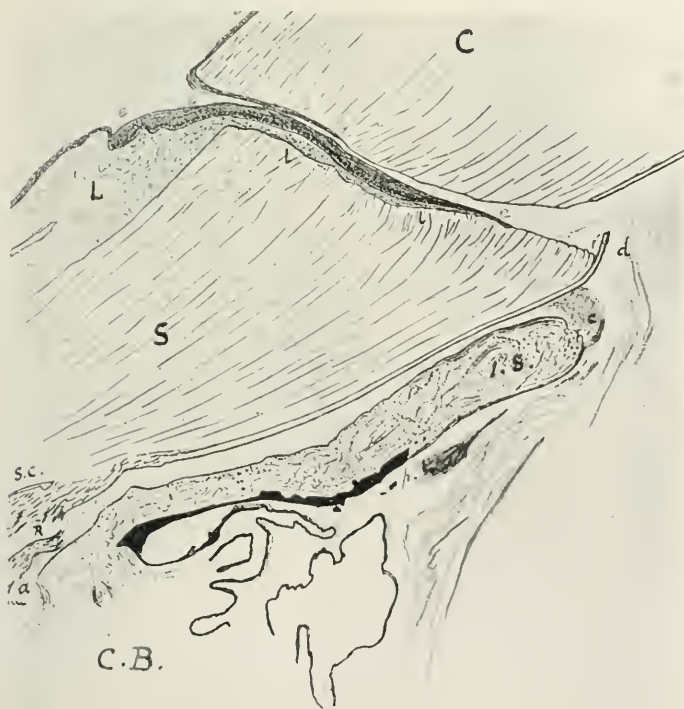




FIG. III.—Corneal Incision. 13 days after simple extraction.



FIG. IV.—Linear Cicatrix following Corneal Incision.

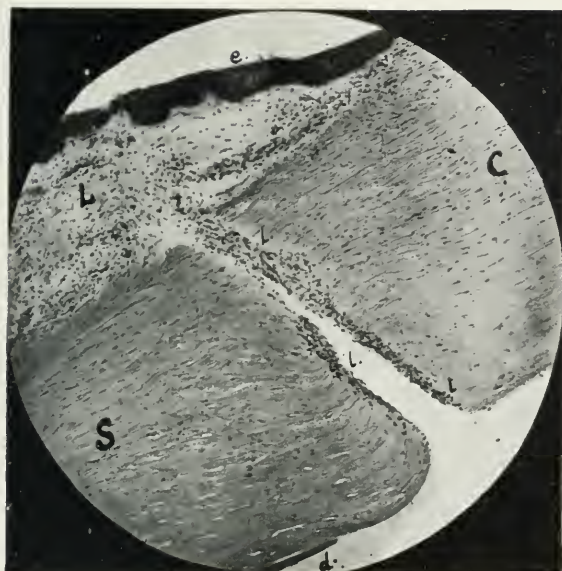


FIG. V.—Scleral Incision. 7 days after operation.

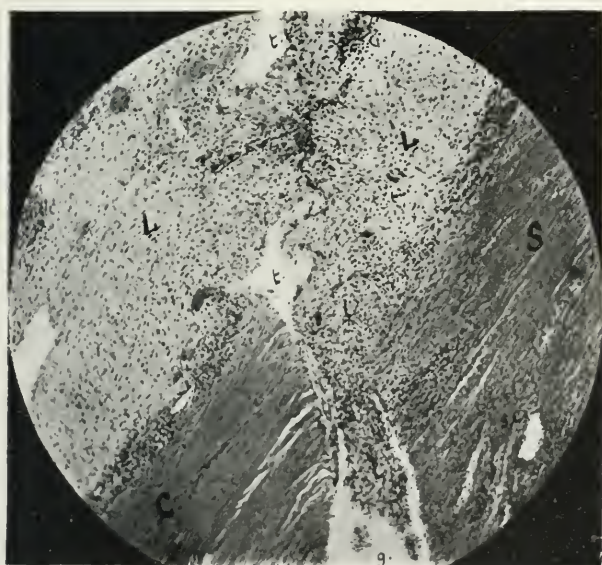


FIG. VI.—Scleral Incision. 8 days after Graefe's extraction.

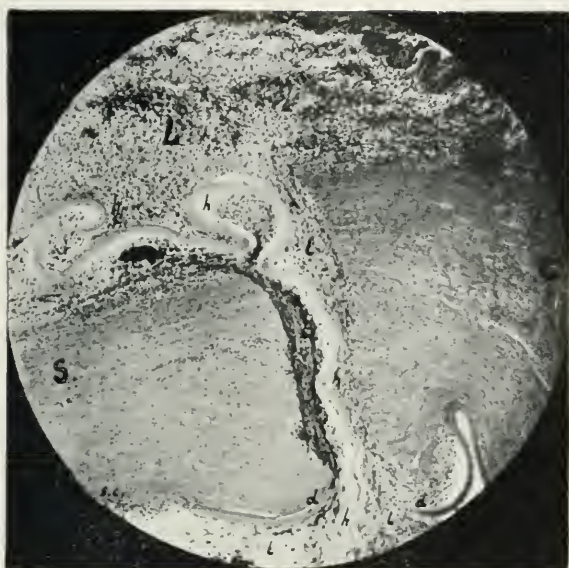


FIG. VII.—Scleral Incision. 20 days after Graefe's extraction.

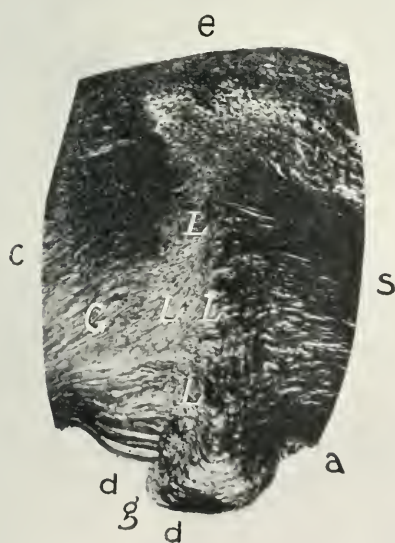


FIG. VIII.—Scleral Incision. Intermediate stage of cicatrization.

DESCRIPTION OF PLATES.

FIG. I.

CORNEAL INCISION from a case in which cataract extraction with iridectomy had been performed three days previously. The incision lies just within the Limbus *L*. There is marked forward displacement and overlapping of the Corneal Flap *C*. The Surface Epithelium *e*. has descended half-way down the scleral margin of the incision. Absence of fibrinous plug or of any signs of reaction on the part of the corneal tissue. *d*. Descemet's Membrane. *S.C.* Schlemm's Canal and Fontana's Spaces. *C.B.* Ciliary Body. *I.S.* Iris Stump, with *c*. its cut surface, and *r*. rent towards *a*. Angle of the Anterior Chamber. *p*. Posterior Pigment Layer. *a. l. c.* Anterior and *p. l. c.* Posterior Lens Capsule enclosing lens debris.

FIG. II.

CORNEAL INCISION 12 days after extraction with iridectomy. There is a marked displacement forward of Corneal Flap *C*. The Surface Epithelium *e*. is growing down both margins of the incision ; along the Scleral Margin *S* this is accompanied by a descent of the Limbal Tissue *l*. Tag of Descemet's Membrane *d*. The Ciliary Body *C.B.* with Iridectomy Stump *I.S.* with Cut Surface *c*. and partially denuded of its Posterior Pigment Layer *P*. At the Angle of the Anterior Chamber *a*. there is a Rent *R*. through the Pectinate Ligament into the Supra-chorioid Space.

FIG. III.

CORNEAL INCISION 13 days after simple extraction. The incision lies just within the Limbus *L*. The margins are in good apposition. The Epithelium has grown down both lips of the wound, and at the centre forms a solid mass *e*. resting on a fibrinous deposit *f*. The Limbus *L*. is swollen, and shows considerable reaction resulting in a descent of its Tissue *l.l.* along the scleral margin of the wound. At *R*. there is a diverticulum owing to direction of incision being altered. The Endothelium *g*. covers the gap on the inner aspect of the incision.

FIG. IV.

LINEAR CICATRIX FOLLOWING CORNEAL INCISION. Sclera *S*. Cornea *C.*, with Wound Track *t. t.*, at inner extremity of which there is a Gap *g*. between the two ends of Descemet's Membrane *d*. and *d*. caused by a piece of the membrane being broken off.

This intervening space is lined by the Posterior Endothelium, which is laying down a homogeneous membrane to seal the inner extremity of the wound. *C.B.* Ciliary Body, with Iridectomy Stump *I.S.* having its Cut Surface *c.* directed backwards.

FIG. V.

SCLERAL INCISION 7 days after extraction. The gaping at inner extremity of the incision is artificial. The connective-tissue of Limbus *l.l.* has grown down the wound track to the inner extremity of the wound. Both lips of incision are denuded of Descemet's Membrane *d.* Entire absence of any signs of reaction on the part of the corneal tissue.

FIG. VI.

SCLERAL INCISION 8 days after Graefe's extraction. Unlike a typical Graefe incision, the wound runs very obliquely through the Sclera *S.*, so aiding the displacement of the Corneal Flap *C.* Between the lips of the incision is a young Connective-tissue Growth *l.* derived from the Sub-conjunctival Tissue *L.*, the cells of which lie in a vertical direction. *S.C.* Schlemm's Canal and Fontana's Spaces. *g.* Gap at inner extremity of incision. *t.* Track of Wound through Sub-conjunctiva.

FIG. VII.

SCLERAL INCISION 20 days after Graefe's extraction. At time of death wound appeared soundly and well healed, the conjunctiva being, however, a little swollen. The Anterior Lens Capsule *h. h.* is prolapsed, and down both its surfaces the connective-tissue has descended into the Anterior Chamber *l.l.* *S.* Sclera. *S.C.* Schlemm's Canal with Pectinate Ligament and Descemet's Membrane *d.*

FIG. VIII.

SCLERAL INCISION, Graefe's section; date unknown. Intermediate stage of cicatrisation. Section stained after Van Gieson's method. The Intercalary Mass *LL* is composed of cells lying vertically, and also of connective-tissue fibres whose direction is that of the corneal lamellæ. The Corneal Flap *C.* is displaced forward, and the Gap *g.* between the severed ends of Descemet's Membrane is lined by a layer of Endothelial Cells. *a.* Angle of Anterior Chamber. *e.* Surface Epithelium. *L.* Sub-conjunctiva.

REVIEWS.

AUBARET (Bordeaux). Eclipse Scotoma. *Archives d'Ophthalmologie*, February, 1907.

THE article opens with an introduction, in which the author comments with surprise on the facts that though defect of sight from exposure to the direct rays of the sun was known to the ancients, and individual cases had been recorded in modern times, no attempt was made to deal exhaustively with the subject until the observations which he and Lescarret made in the Clinique of Badal in 1900 were published early in the following year. Aubaret returns to the subject, and adds to our knowledge from the clinical aspect, concluding with an interesting and ingenious suggestion as to its pathology.

Complaint of visual defect is made within a few hours by patients who have exposed the eye without the protection of smoked glasses in viewing a solar eclipse. With the eye affected (in most cases only one eye is involved) the patient is unable to recognise features at a certain distance; the scotoma at about 20 metres is sufficiently large to embrace the whole area of the face; it is positive, and usually well defined, circular and in ratio with the size of the retinal image of the sun's disc; measured by various methods at the punctum proximum, it is about 2 m.m. in diameter; an irregular trembling of the scotoma is a constant phenomenon, and is explained as due to efforts on the part of the patient to fix or to evade the defect in the field; sometimes the scotoma is paracentral, in which case it is always displaced slightly upwards and to the right of the fixation point; metamorphopsia is common; colour vision and perimetric field are unaffected; occasionally an evanescent conjunctivitis is an associated symptom. Aubaret reports several new cases illustrative of the above clinical picture; in none were fundus changes of any kind detected with the ophthalmoscope. In the paper above referred to as published in 1901, Lescarret and Aubaret had observed macular changes in three out of twelve cases—"a veil through which one seemed to see an ecchymotic spot": the appearance was thought to be the normal colour of the macula rendered more conspicuous by cedema of retina in the perimacular region. Villard had recorded the same appearance as a true hæmorrhage. In an early case Marquez observed

double neuro-retinitis; as late lesions optic atrophy has been recorded; thrombosis of a retinal artery and retinal hæmorrhage by Batten, while Ménacho reported examples of papillitis, hyalitis, macular hæmorrhage, optic neuritis, and retro-bulbar neuritis; other observers have found somewhat similar conditions; to many of these Aubaret raises well-founded objections, *e.g.*, to the two cases of hyalitis, "that they occurred in high myopes"; to an example of serous choroiditis, "that the patient had long suffered from maxillary empyema." Aubaret thinks that ophthalmoscopic changes in cases of eclipse scotoma are generally conspicuous by their absence, or when present are of the slightest, and due to œdema. As to prognosis, the cases which ophthalmic surgeons see are the severe ones; slight cases rapidly get well; only those which do not quickly recover come under observation; some improvement even in these is common; the scotoma gets less dense, though diminishing but little in area; the patients eventually accept the situation and experience little permanent embarrassment when, as is usual, only one eye is damaged. One patient seen twenty-eight years after onset in the right eye, was a good shot from the right shoulder; he made use of his scotoma to discharge his weapon "when the sights came on" the object, *i.e.*, when sights and mark became invisible. Another case was examined after an interval of forty-five years. As to pathology, experimental work by the author, supplementing similar investigations by Czerny, Deutschmann, Widmark and Cassien, is briefly described.

The question of whether heat rays, light rays or actinic rays are to be held responsible is discussed. The possibility that heat rays can by any means produce anything like a burn of the retina or coagulation of its albuminous fluids is emphatically rejected. Experiments have shown that actinic rays cannot be claimed to affect the visual purple more actively than light rays; the latter undoubtedly do affect it; visual purple resides in the rods only; its function, as Parinaud maintains, is to adapt the eye to light stimulus of feeble intensity; its disintegration and regeneration is a very slow procedure. Luminous rays alone produce photo-trauma; they must be of sufficient intensity if they are to produce any visual sensation; if they exceed a certain amplitude of vibration they fatigue the nervous elements of the retina or strain them beyond the breaking point. To protect the retina against such injury the eye diminishes the palpebral fissure, contracts its pupil and throws

a pigment curtain over the rods and cones by means of the amoeboid processes of the hexagonal cells of the retina; each of these protective mechanisms Aubaret regards as a true reflex phenomenon, and in the case of the last-named the reflex arc is discussed. When the intensity of light passes the limit against which these reflexes can protect the retina, each cell of the retina has to take its own defensive measures, which consist, as in unicellular organisms, in a withdrawal of its processes; if the injurious stimulus is extreme such retraction becomes permanent and the neurone chain is irremediably broken. Congestion or oedema of the retina or chorio-capillaris, when present, is regarded as a further reflex of vaso-motor character. Such an explanation Aubaret considers capable of application to all degrees of eclipse scotoma, and therefore the more worthy of acceptance; he believes also that it accords closely with cases of sudden deafness due to intensity of sound vibrations, and the parallel appears a good one.

J. H. FISHER.

CRAMER (Kottbus). **The Origin and the Clinical Peculiarities of the Glassblowers' Cataract.** *Klinische Monatsblätter für Augenheilkunde*, January, 1907.

In this paper the writer gives his experience and theories on the subject of glassblowers' cataract. He criticises the opinions generally held as to the causation of these cataracts. Some writers consider that the extreme perspiration produced by the excessive heat and the increased evaporation from the surface of the cornea produce a concentrated condition of the aqueous which tends to the formation of the cataract; others that heat alone is the chief element in the causation; while one writer (Peters) gives it as his opinion that the congestion of the veins caused by continual blowing has some connection with the production of the lens opacity. As regards the latter view, Cramer remarks that if it were correct then both eyes would be affected equally; also that players of wind instruments would be similarly affected. He considers that the continual exposure to great heat encourages the early formation of cataracts, but that these do not differ in their course or character from ordinary senile cataracts, except in their earlier onset, and that while heat may be a factor in the case of the glassblowers' cataract, it is not the principal cause.

The writer first draws attention to the fact that the left eye is nearly always affected first, and that the reddish-brown discoloration of the skin of the cheek, so often seen in these glassworkers is also mostly on the left side, and accounts for both in the same way, namely, that the worker, except when he is left-handed, turns that side of his face to the furnace.

The opacity of the lens at its commencement is invariably limited to the posterior pole, and is always within the pupillary area. It is at first of a punctate character, the little dots being arranged in the form of a ring just within the pupil. Later this character is lost, and the opacity becomes more uniform, but still limited for a long time, often for years, to the posterior cortex and the pupillary area. Eventually it extends to the rest of the cortex, and finally becomes general.

The writer's opinion is that these changes are primarily the result not of heat but of light, and he draws his conclusions, first, from the fact that the changes commence in the posterior part of the lens, where naturally the rays of light are most concentrated, whereas if heat were the cause it would affect principally the more exposed anterior portion of the lens; moreover, the lens is protected from heat by the presence of fluid in the anterior chamber. Further, the fact of its commencing in the pupillary area tends to show that it results from the chemical action of light, as this is the only part of the lens which is exposed to such rays, the rest of the lens being behind the iris, which absorbs these rays by means of the blood and pigment it contains. He draws a close analogy between the patches of discoloration on the skin of the face and the formation of the cataract, and asserts that the production of pigment can only result from the chemical action of light rays, and especially of the ultra-violet rays, and that heat alone cannot do it. He quotes Unna and Widmark in confirmation of this, the latter having demonstrated by experiment that ultra-violet rays cause a condition of the skin indistinguishable from that which the glassblowers exhibit. Thus he concludes that the principal cause of glassblowers' cataract is the chemical action of the light rays from the molten glass, and especially of the ultra-violet rays, acting through many years.

Finsen has demonstrated that limelight gives out ultra-violet rays to a considerable extent, and as lime forms one of the ingredients of glass it is probable that it is the source of the ultra-violet rays.

With regard to the treatment of glassblowers' cataract, Cramer calls attention particularly to the friability of the lens capsule in these cases, which renders them unsuitable for trituration, which he commonly practises in other cases. Here the anterior capsule is liable to rupture and the anterior chamber to become filled with lens matter.

Attention is also called to the fact that dacryocystitis is an almost unknown complication of glassblowers' cataract. The absence of this is all the more marked because in the neighbourhood from which Cramer had his cases dacryocystitis and ozoena are peculiarly common. He attributes this immunity to the action of the ultra-violet rays on those micro-organisms which are active in the production of dacryocystitis, and particularly the pneumococcus.

With regard to the prevention of glassblowers' cataract, the writer recommends the wearing of red spectacles, or, better, that a glass screen filled with water coloured with fuchsin or some other red dye should be placed between the worker and the furnace. Through this glass chamber, which need only contain a thin layer of the fluid, should be a hole just large enough to allow the blowpipe with a mass of molten glass to pass through. By such an arrangement the glass-worker would be protected from both the intense heat and the effect of the chemical rays.

CHARLES BLAIR.

H. MARX (Heidelberg). **The Pathological Anatomy of the Eye Changes in the Morbus Maculosus of Werlhof.** *v. Graefe's Archiv*, July, 1906.

In the group of diseases included in the "hæmorrhagic diathesis" eye changes are seldom found. Most observations have been made in scorbutus, in which sub-conjunctival hæmorrhages, keratitis and panophthalmitis occur. The fundus changes are rare, but comprise retinal hæmorrhages, papillitis and optic atrophy.

Krebel, in a case of scorbutus, found dilatation of the blood-vessels of the optic nerve, extravasation of blood between the choroid and sclera, and general passive congestion of the eye.

Rudnew observed purulent infiltration of the choroid and vitreous, but in his case the microscopical findings were imperfect.

Goh found hæmorrhagic neuro-retinitis in a case of scurvy. Microscopically, hæmorrhages were found in the nerve fibre and ganglionic cell layers of the retina, and circumscribed degeneration of the nerve fibres. There were no definite changes in the blood-vessels. Changes similar to those occurring in scorbutus are found in purpura simplex and rheumatica, peliosis rheumatica and the morbus maculosus of Werlhof.

The author's case of the latter disease occurred in a man aged 32. The patient had always had good health. Fourteen days before admission to hospital he noticed a blue-red spot at the root of the penis, and later hæmorrhagic spots appeared on the limbs and in the mouth. On admission the whole skin and the mucous membrane of the mouth were covered with small hæmorrhagic spots; and with fever, weakness and rapidly increasing anæmia the patient died on the sixth day. Two days before death, on ophthalmoscopic examination, hæmorrhages above and below the disc and extravasation into the disc were noticed. The vessels appeared normal and the media clear. No sub-conjunctival hæmorrhage was present.

Post-mortem, the following changes were present: Multiple pial and sub-pial hæmorrhages, punctiform and confluent cerebral and cerebellar hæmorrhages, sub-pericardial and endocardial hæmorrhages, hæmorrhage in the stomach, lungs, spleen, rectum and colon. The lungs were oedematous, the liver sclerosed. The right eye, macroscopically examined, showed large retinal hæmorrhages around and almost covering the papilla, and smaller ones extending as far forwards as the equator of the eye. There were a few small yellow spots in the neighbourhood of the disc. Microscopically, numerous hæmorrhages were present in the nerve fibre layer and between the retina and the hyaloid membrane, also copious hæmorrhage in the granular layers, though more in the inner than in the outer layer. There were also a few hæmorrhages between the pigment and neuro-epithelial layers. The red blood corpuscles showed disintegration and hyaline degeneration. Fibrin formation did not exist to any extent. Numerous mononuclear round cells were present with a few small polynuclear elements, both diffused in the hæmorrhages and collected together into nuclei of infiltration. Masses of the same cellular elements formed knots on the sheaths of the medium-sized arteries and veins, and a thick layer surrounded the central artery at its exit from the nerve. Very little change was

noticed in the inner molecular and ganglion cell layers. In the nerve-fibre layer thickened bundles, separated by empty spaces, were seen, and also round nodules, which stained deeply with eosin. (These so-called varicose nerve fibres were originally regarded as changed ganglia, but, according to later observers, are degenerated leucocytes.) Fat granules were nowhere seen. The pigment epithelium was normal except where hæmorrhage existed between it and the retina. In its anterior portion the retina was quite normal. About the ora serrata cystoid degeneration was found. The choroid, ciliary body, iris, lens and sclera were unchanged. The conjunctiva showed slight round-cell infiltration. In the optic papilla mononuclear cells were seen. The nerve fibres were normal, and no blood was present. Some hæmorrhage existed between the nerve sheaths 1 cm. behind the eye.

Of special interest was the condition of the blood-vessels, and it was somewhat remarkable that, beyond the infiltration of their coats previously mentioned, no pathological changes whatever were demonstrable in them. The arteries were mostly empty, but the veins contained normal blood. No bacteria nor thrombi were found. In the sheath of the oculo-motor nerve an extensive hæmorrhage was present. The ciliary nerves showed no pathological change. In the sheaths of the eye muscles, here and there round-cell infiltration was found, but the muscle substance itself was normal. The left eye showed similar changes to the right.

The author points out the likeness of the retinal lesions to those found due to the presence of micro-organisms or their toxins. The case is distinguished, however, from a typical "retinitis septica" by the cellular infiltration masses, especially around the vessels, which are not found in that disease.

H. HORSMAN McNAB.

C. BRONZ (Freiburg). **Gram-Negative Diplococci in the Conjunctival Sac.** *Klinische Monatsblätter für Augenheilkunde*, January, 1907.

In this paper Dr. Bronz sets out in detail his observations on several stems of gram-negative diplococci which differed from Neisser's gonococcus, and discusses very fully their points of resemblance with that organism and the differential diagnosis of the two forms. Seven stains were thoroughly examined as to their morphological and cultural peculiarities, and full details are given of these. Dr. Bronz being a bacteriologist of

exceptional ability and extremely painstaking, the detailed results are models of what such should be. The chief interest to the practical student of ophthalmic bacteriology lies in the thorough comparison which is given of these organisms (the *diplococcus catarrhalis*) with the *gonococcus* and the *meningococcus*.

Compared with the *gonococcus* the secretion preparation is not diagnostic, and cultures are necessary to differentiate the two forms. The colonies of *diplococcus catarrhalis* grow readily on ordinary agar, and are yellowish-grey, opaque and large; they have a harsh crumbly appearance and will grow at ordinary room temperature. The *gonococcus* grows rarely and very sparsely on ordinary agar, and even with the addition of ascitic or serous fluid the growth is poor; the colonies are clear, light-grey, beaded, soft and gelatinous, and never occur at room temperature.

Compared with the *meningococcus*, the distinction is not so readily made. The *meningococcus* will only grow on agar after several (6) generations on ascites agar. The colonies are light-grey, transparent, finely granular, with a wavy outline, and of a pulpy, sticky consistency; no growth occurs in gelatin at room temperature, and they always die out more readily than the *diplococcus catarrhalis*. There is also a distinction to be made by the agglutination tests, and the decomposition of sugar in the media.

Discussing the *diplococcus catarrhalis*, Bronz relates in detail its various recorded occurrences, and quotes fully the description by Ghon and Pfeiffer, which agrees with his own; also the observations of Zingelsheim, von Bernheim, Neisser, Lehman, Newmann and Gunther, who all found similar organisms. Bronz says: "I do not hesitate to consider the six stems of gram-negative diplococci found by me in the conjunctiva as identical with the *micrococcus catarrhalis*. I clearly distinguish between the *gonococcus*, *meningococcus* and the *micrococcus catarrhalis*, and agree with Ghon, Pfeiffer, Czaplewski, Zingelsheim and Gunther, that these are three different members of a family of which the *gonococcus* is the most delicate and the *micrococcus catarrhalis* the most robust."

After a short notice of some other gram-negative cocci, Bronz emphasises the difference clinically between the gonococcal inflammation, *B. blennorrhœæ*, and the mild catarrh of the *diplococcus catarrhalis*, and concludes as follows:—

1. The genuine clinical picture of blennorrhœa is, in cases where the typical gram-negative diplococci are found, always caused by the gonococcus.

2. Gram-negative organisms occur in the conjunctival sac, which are so similar to gonococci that it is impossible to distinguish them by a secretion preparation alone. That can only be done by cultures.

3. A large proportion of these organisms is identical with the micrococcus catarrhalis.

4. Gonococcus, meningococcus and micrococcus catarrhalis are different members of a group, in which the gonococcus is the most delicate, and the micrococcus catarrhalis the most robust form.

5. All three varieties are readily and with certainty distinguishable in cultivation.

ANGUS McNAB.

ERRATUM.

In our issue of last month, in the description of Dr. Maddox's Prism-Verger, an error has unfortunately passed uncorrected. On page 102, line 7, the word "not" should be "now."—ED.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Thursday evening, March 14th, at 8 p.m.

The President, Mr. PRIESTLEY SMITH, in the chair.

CARD SPECIMENS.

Cavernous Sinus Aneurism cured by a new method after failure of the usual operation.—Messrs. F. Burghard and Eric L. Pritchard.

This was the subsequent history of a case shown before the Society on December 10th, 1903. On April 7th, 1901, the patient had a fall, and on May 10th there were signs of the formation of an aneurism, so that on June 25th the right common carotid artery was tied by Mr. Silcock, but the symptoms recurred immediately on getting up.

On February 20th, 1905, the patient was admitted to King's College Hospital, under the care of Mr. Burghard, when he was found to have proptosis of the right eye to the extent of 3 mm.; the conjunctiva was injected, and there was pulsation of the globe, though no resistance to backward pressure. The fundus was normal. A loud, rough, systolic murmur was heard over the right temporal and orbital regions, and the vessels could be felt beating above the seat of ligature of the common carotid artery, and pressure in this region controlled the bruit. Muscular

movements of the eye were good. The external and internal carotid arteries were tied with no permanent benefit; so that on March 9th the right angular vein was ligatured. From this time onwards there was a complete cessation of the symptoms with no recurrence, except a slight temporary one; though for several weeks a troublesome chemosis persisted, which eventually cleared up.

The vision in the right eye, at the present time, is $\frac{4}{60}$, the optic nerve is pale, and the noises in the head and the bruit have completely disappeared.

In the discussion which followed, Mr. Higgins pointed out that these cases were usually of the nature of an aneurismal varix and not a true aneurism, and that the simpler operations, such as tying the angular vein, were more likely to effect a cure than any of the major operations; indeed, they often got well without any treatment whatever.

A case of Oxycephaly.—Mr. George Coats.

Fred R., aged 8, came to the Great Northern Central Hospital on February 21st, 1907, on account of an error of refraction. He showed the deformity of the head known as oxycephaly; the face was broad in the zygomatic region, and from that point tapered rapidly to a rounded boss in the frontal region. The superciliary eminences were flattened, the sagittal suture was represented by a prominent crest, and the cranium was markedly brachycephalic. The refraction was :

$$\begin{array}{cc} \text{R} & \begin{array}{c} +8 \\ | \\ -10 \end{array} & \text{L} & \begin{array}{c} +10 \\ | \\ -12 \end{array} \end{array}$$

and the vision with correction was R.V. $\frac{6}{24}$, L.V. $\frac{6}{24}$. Nystagmus was present. There was no exophthalmus, the palpebral fissure was of normal width, the ocular movements and the fields of vision were full. The deformity had existed since birth, and had not increased lately; labour had been prolonged but otherwise normal. The patient presented no signs of rickets, and his intelligence was good; there had been occasional headaches since attending school. There were no other deformities in the family, and no specific history.

A case of Oxycephaly (moderate).—Mr. Leslie Paton.

Eleanor H., aged $12\frac{1}{2}$, came to St. Mary's Hospital in June 1906, with the history of an external squint which had become worse lately. The patient suffered from intense headache, and the sight had considerably deteriorated for some time past. Vision was found to be less than $\frac{6}{60}$ in both eyes.

There was a moderate amount of "Tower-Skull," the face was long and narrow, the nose had a broad bridge and came straight down from the forehead; the eyes were divergent and slightly prominent; there was no nystagmus. The optic discs were pale and of a bluish-white opaque tint, the lamina cribosa was not visible, but the edges were well marked and the vessels normal with perhaps a tendency to thickening.

Under the administration of iodide of potassium the sight improved so that by August 14th the R.V. was $\frac{6}{24}$ and the left $\frac{6}{36}$, while the headaches were considerably relieved. In March 1907, the headaches returned and the visual acuity again diminished. R.V. with correction = $\frac{6}{24}$, L.V. $\frac{6}{60}$ not improved.

Corneal changes in a case of Myxædema, probably due to a deposit of mucin in the fibrous tissue.—Mr. E. Treacher Collins.

Mrs. S., aged 58, came to the Royal London Ophthalmic Hospital on March 11th, 1907, suffering from pain and inflammation in the left eye; it had been present on and off for 6 months. She had bad sight and saw spots and coloured rings in front of her eyes. Her general health had been bad for 7 months, and "her limbs were swollen and the body getting larger"; the skin was waxy looking, the neck was flattened in the region of the thyroid gland, and the speech was slow and laboured. The urine was normal. R.V. $\frac{6}{6}$, L.V. $\frac{6}{36}$ not improved.

In the left eye there was slight ocular conjunctivitis, and in the centre of the cornea a greyish haze made up of several small, discrete, globular-looking, grey dots, in the anterior layers of the cornea; there were some elevations of the surface over the region of the opacity. The periphery of the cornea was clear; tension was normal, and in all other respects the eye was healthy.

The globular appearance of the dots suggested that they might be drops of mucin deposited in the fibrous tissue of the cornea as mucin is deposited in the skin and fibrous tissue of other structures in myxædema. Mr. Collins intended to try the effect of thyroid extract.

Peripapillary Ectasia with inclusion of the Optic Nerve.—Mr. W. Ilbert Hancock.

Gwendoline O., aged 11, came to the Central London Ophthalmic Hospital on March 4th, 1907, complaining of headache and defective sight in the right eye; these symptoms had been noticed for some years, and had not increased recently. There was no history of tumour or inflammation. R.V. c-1.5 cyl. = $\frac{6}{18}$; L.V. c+0.5 sph. and +0.5 cyl. = $\frac{6}{6}$. The fundus of the right eye showed in the region of the optic nerve a deep, sharply-defined, cup-like depression of the sclera, so disposed that

the nerve head was seen lying quite flat slightly to the temporal side of the bottom of the cup. The edge of the cup, best seen with O, was circular, sharply cut, and deeply pigmented, and surrounded by atrophic choroid; the floor of the ectasia was seen with a-14D. The upper retinal vessels emerged from the centre of the disc and could be traced throughout their course; the lower retinal vessels, while easily traced in their first part, were soon lost to view, and reappeared by piercing a semi-transparent, crescentic-shaped membrane, which partially bridged over the scleral aperture below. The rest of the fundus was quite normal; there was no buphthalmos, and the cornea was 11.5 mm. across.

An Unusual form of Lenticular Opacity.—Mr. H. Grimsdale.

L.M., aged 13. The right eye was normal, but the left converged, and in the lens of the latter was seen, in the position of a small lamellar cataract, an opacity made up of two layers each consisting of a fine film composed of many rounded dots which closely resembled those of Keratitis Punctata; the posterior layer was the denser and appeared to be situated at the posterior capsule.

PAPERS.

Case of Acute Septic Meningitis with Thrombosis of the Cavernous Sinus.

Dr. W. C. Rockcliffe.

Alfred J., 21, was admitted to the Hull Royal Infirmary on November 16th, 1906, suffering from proptosis of the right eye. There was nothing of importance in the history previous to this illness.

On November 13th, 1906, the patient noticed a small spot on the right side of the upper lip; this was pricked and scratched with a view to its removal with the result that it became infected with septic material, and erysipelas occurred with much swelling of the lip and right side of the face; on November 17th delirium made its appearance; on admission he was found to have much swelling on the right side of the face starting from the lip, œdema of eyelids, chemosis, proptosis, fixation of the eyeball, but no tenderness, and the vision was normal. There was delirium, the temperature was between 102° and 103°, but no rigors. Sedatives were administered, and Dr. Eve performed lumbar puncture. On November 19th, some œdema appeared over the mastoid, extending downwards over the course of the jugular vein. Death took place on November 20th, and at the post mortem examination it was found that the meninges in the region of the right cavernous sinus were covered with lymph, and the right, the transverse, and part of the left sinus were thrombosed, the remaining sinus being free. The right orbital tissue was much inflamed and swollen and the veins were distended, but there was no pus.

The cerebro-spinal fluid which had been drawn off was centrifuged, and a culture showed colonies of staphylococcus aureus.

Dr. Rockcliffe drew attention to points described by Fuchs in the diagnosis between orbital cellulitis and thrombosis of the cavernous sinus; in the latter there is, in addition to other symptoms, œdema in the mastoid region, and in the former the second orbital cavity hardly ever becomes affected.

Four cases of Sympathetic Irritation, occurring after 18, 22, 28, and 50 years.—Dr. W. C. Rockcliffe.

Four cases were described where sympathetic irritation occurred after a varying number of years, but as regards the last case it was admitted to be doubtful whether it should be included as a case of sympathetic irritation.

The first case was that of a patient aged 40, who sustained an injury to the left eye in 1882 while chipping a stone with a metal chisel; in 1893 and 1896 the eye received additional blows, and during the next 4 years the right eye was subject to repeated attacks of conjunctival inflammation. In May 1900, there was sympathetic irritation of the right eye with some keratitis punctata; the left eye was excised in June 1900, and the foreign body (steel) found at the back of the globe.

The second case had the right eye injured by a punctured wound, resulting in complete disorganization of the globe; 22 years afterwards some hot acid splashed into this same eye, and irritation appeared in the other eye, followed by iritis, synechiæ, and dense keratitis punctatis. The right eye was excised and the left improved, but the deposits on the cornea remained and the vision was $\frac{6}{60}$.

The third case was that of a patient who had received an injury 51 years previously to the left eye by a piece of stone, resulting in traumatic cataract; there was myopia of 10D. in the right. In January 1907, the right eye became glaucomatous with tension of +1 and some keratitis punctata. In February the left eye was excised.

The fourth case was that of a man aged 56, who had received 28 years before a blow in the left eye with some hot metal; in November 1906, there was a question of sympathetic inflammation in the other eye, though no definite signs of cyclitis were present; but there was a suspiciously glaucomatous appearance about the optic disc; and as a result of instillation of atropine for refractive purposes, the vision was reduced to counting fingers, with loss of a part of the visual field. On February 5th, 1907, the left eye was removed, there being no P.L., and on February 20th the sight of the right eye was somewhat improved.

Cysts of the Pars Ciliaris Retinae.—Mr. A. R. Brailey.

The conclusions arrived at in this paper were drawn from the examination of 20 microscopical specimens, one of which was cut in complete serial section, all the sections being kept; the latter method of cutting and examination is the only reliable one for definitely proving the existence of a true cyst, though the discovery of material in the interior of the cyst different in structure or staining properties from that in the posterior chamber is also good evidence of the existence of a genuine cystic formation.

The following conditions may simulate the formation of cysts:—

- (1) Simple depressions in or between neighbouring ciliary processes.
- (2) Contact, with true union, of adjacent processes.
- (3) Free bands of proliferated epithelial cells stretching between the processes or forming festoons on the flat part of the ciliary body.
- (4) Fibres of the zonula, anterior limiting membrane of the vitreous, or fibrous bands of new formation united to the ciliary processes.

Mr. Brailey proposed to classify these cysts according to their several modes of origin, premising that the general pathology in this class of case consisted in hypertrophy of the ciliary processes and proliferation of the epithelium. The proliferation was generally confined to the non-pigmented layer, though occasionally it occurred in the pigmented layer.

There are three obvious possibilities of origin in the formation of these cysts.

- (1) Simple detachment of the non-pigmented layer.

(a) Detachment of both pigmented and non-pigmented layer.

- (2) Proliferation of epithelial cells with formation of a cavity in the centre of the mass.

- (3) Proliferation and union of cells of adjacent processes leading to shutting off of a portion of the posterior chamber.

According to Kuhnt, the first is the commonest mode of origin, and Mr. Brailey's investigations confirmed this, and they also indicated that detachment of both layers never occurs.

Mr. Brailey found examples of all three methods of cyst formation. In the first class of cases, which constituted 40 per cent. of the whole number, there was a single layer of non-pigmented cells lining the inner wall, but no proliferation and no vacuolation; this kind of cyst is found after evacuation of the aqueous fluid.

The second class of case has both kinds of cells bounding the cyst, but while the outer layer is unaltered, the inner may be normal, proliferated, or vacuolated. This constituted 25 per cent. of the cases. The third class has both kinds of cells forming the outer wall of the cyst, with proliferation of cells from adjacent processes which finally fuse, and ultimately form cysts enclosing a portion of the posterior chamber.

MALCOLM L. HEPBURN.

A CASE OF EPIBULBAR SARCOMA.

J. R. FOSTER, F.R.C.S. (Edin.), West Hartlepool.

IN Vol. I., Part I., of Herbert Parsons' "Pathology of the Eye," the following short paragraph on the subject of epibulbar sarcoma occurs:

"The general opinion as to malignancy is voiced by Strauss, who says that epibulbar sarcomata never penetrate the globe and rarely produce metastases. Verhoeff and Loring regard them as highly malignant, judging by their tendency to recur and to form metastases."

This paragraph recalled to my mind a case which was under my care in 1904, and which deserves to be recorded, I think, in view of the diversity of opinion on this important subject. The patient, who was a boy four years of age, was sent to me in October, 1904, by Dr. W. Ross, of West Hartlepool, for consultation. He had on the outer side of the right eyeball in the interpalpebral region a small dark growth, slightly raised above the conjunctiva, roughly circular, about four millimetres in diameter, and freely moveable on the eyeball. The mother volunteered the statement that the growth had been there since birth but had recently perceptibly increased in size; hence her anxiety for medical advice. Operation was advised, and a couple of days later chloroform was administered and the growth freely removed. In February of the following year (5 months later) a recurrence was noticed by the parents, and the patient was brought again to see me.

The recurrence was a small red nodule situated a little below the site of the original growth, more circumscribed and more raised, and smaller than the primary growth;

it was also freely moveable on the globe. We sent the patient to Dr. A. S. Percival, of Newcastle-on-Tyne, who recommended conservative methods. Accordingly a few days later Dr. Ross kindly again administered chloroform and I freely removed the nodule, laying bare an area of sclera, which could scarcely be covered by the end of the fore-finger. At the present time, two years and two months since this last operation, the boy is strong and well and shows no signs, either generally or locally, of any recurrence. The following report was kindly made for me by Mr. Elmore W. Brewerton:

REPORT OF MR. BREWERTON.

The primary tumour consists of a small nodule with some outlying processes, covered by a few flattened epithelial cells and resting on the submucosa of the conjunctiva, which latter shows no evidence of infiltration. The cells of the nodule are arranged in large alveoli, and are mostly small with a large nucleus. At the centre of each alveolus are large epithelial cells.

The tumour is non-pigmented and contains a few small blood-vessels resembling capillaries. Diagnosis: congenital mole.

Recurrent growth. The tissue consists of the whole thickness of the conjunctiva, in the deeper tissues of which is a small round nodule. This nodule consists of cells resembling the smaller cells of the primary growth. The nodule is not encapsulated and in one portion the cells are infiltrating the surrounding tissues. The conjunctiva is more vascular than usual. There are no definite blood-vessels in the nodule.

Diagnosis. The tumour is now undoubtedly sarcomatous.—Elmore Brewerton."

Unquestionably these reports show the tumour to have been sarcomatous, for although the primary growth is described microscopically as a mole, there is no doubt it was becoming sarcomatous, at least the increase in size noticed by mother indicates this in all probability.

REVIEWS.

P. BAJARDI (Sienna). **Inoculation of an Ape with Trachoma.**
La Clinica Oculistica, January, 1907.

THAT trachoma is contagious all are agreed, but there is no general consensus of opinion regarding the precise mode of transmission or the organism causing the disease. Müller's bacillus, at one time thought to be the cause, is now found to be inconstant as regards its presence in the secretion and the follicles, and inoculation of a culture of the germs does not succeed in producing the disease, as Lürssen has satisfactorily shown. Raehlmann's researches in "ultra-microscopy" of trachoma have failed also to lift the veil which hides the origin of the disease. He has found, however, (1) that very mobile micro-organisms are constantly present which thrive and proliferate actively in media kept at body temperature; (2) that in trachoma minute masses of protoplasm exist, with spontaneous mobility, resembling protozoa, and capable of continued life and vigour outside the tissues, provided they are kept moist and warm; (3) that besides the organisms and the masses of protoplasm there are also extremely minute gray and yellow spheres, distinguished from the micro-organisms of similar form by their lack of spontaneous movement; they are found in the secretion from a trachomatous eye, in the cells, and within the protoplasm masses already mentioned. In one of these three,—the bacteria, the protoplasm, or the yellow spheres—lies, according to Raehlmann, the *contagium* of trachoma, which ought not to be considered as being with certainty purely bacterial.

One of the difficulties in deciding what is the true cause of trachoma has hitherto been the impossibility of conveying the disease to the lower animals, but that difficulty has now, as will presently be seen, been overcome. At a meeting of the

Ophthalmological Society of Heidelberg in 1905, Hess and Römer reported that they had succeeded in setting up changes resembling trachoma in the conjunctiva of two monkeys; the appearances had developed four weeks after the inoculation by rubbing repeatedly with fresh material from a trachomatous conjunctiva. One of the monkeys having died they were able also to show both macroscopic and microscopic preparations. To judge from the published report, the Congress was disposed to be somewhat cautious in its acceptance of the conclusions arrived at by the authors, and very little public notice has been taken of the paper.

Their paper appeared during 1906, and in it they claim that they had succeeded in producing in the case of a monkey or monkeys (they experimented with thirteen) whose conjunctiva was previously healthy, lesions closely similar, anatomically and clinically, to those of trachoma. Further, they succeeded in conveying the disease from one monkey to another, the first having been infected from man. They satisfied themselves also that the contagium can be filtered out of a liquid, for, after the Berkefeld filtration of trachomatous material, the filtrate, rubbed into the conjunctiva, was entirely inert, produced no characteristic lesion. Again, fragments of conjunctival tissue, dried and pulverised, failed to excite any definite reaction when introduced into the conjunctiva of the monkey; the same was true if they were kept for half an hour at a temperature of 58—63°C. Salt solution tested after being employed to bathe thoroughly the conjunctiva of a trachomatous eye was also non-pathogenic. These facts seem to indicate that the virulence of the contagium is very easily lowered or annulled.

Bajardi, for his experiments, employed four monkeys (macacus and cercopithecus). His object was two-fold, viz., to accomplish, if possible, direct infection of the Simian conjunctiva from an actual case, and to discover whether or no the virus could pass through a Berkefeld filter. His method was to excise morsels from the conjunctiva while trachoma was in an active state, digest them in a few cm. of physiological salt solution and instill the fluid repeatedly into the scarified conjunctival sac; this he repeated three times in a week. In one case he injected the fluid subconjunctivally; in other instances he introduced the actual piece into a "pocket" dissected out under the conjunctiva. In some of the cases there was some swelling for a day or two, but all returned apparently to normal within a week. But in a few days a

little injection reappeared both on the palpebral and the ocular conjunctiva; the animals opened their eyes with less readiness; there was no discharge and no irregularity of surface, until in about four weeks one could notice numerous very minute nodules, chiefly in the fornices, and particularly near the upper margin of the tarsus, some also on the tarsal conjunctiva itself; in the latter situation their colour was pale yellow, and they were larger than those in the fornix. These appearances were particularly manifest in the eye in which subconjunctival injection had been performed, and went on increasing more or less constantly, invading the whole conjunctiva both of the cul-de-sac and the lids, particularly the upper. A little over three months after the injection the conjunctiva was red, injected, thickened; when the upper lid was turned over that of the fornix was found swollen generally, and presenting numerous localised swellings, some red, some gray; on the palpebral conjunctiva were numerous little nodules, some very small and gray in colour, others larger, gelatinous and semi-transparent. The same was true to a less degree of the semilunar fold; there were some of these alterations even in the bulbar conjunctiva. In short, the appearances in the animal treated, as indicated above, were exactly similar to those present in an ordinary case of fairly developed trachoma in man.

We shall hope to hear of successful experiments on these lines at the hands of other observers, and if Bajardi is correct in his deductions then we have certainly taken an important forward step in our knowledge of trachoma.

W. G. S.

E. ZIRM (Olmütz). **Transplantation of the Cornea.** *Wiener klinische Wochenschrift*, January 17th, 1907.

ZIRM, in this paper, discusses the history of corneal-grafting, with its indications, the procedure to be followed, and the future that awaits the operation. His own successful case has been fully recorded already in the *Ophthalmic Review* (see *Ophthalmic Review*, January, 1907, p. 3), and to the particulars there given can now be added that the vision has continued to improve, so that on December 14th, 1906—rather more than a year after the operation—it was $\frac{6}{36}$? (with a stenopæic disc, and still better with a +5), and with strong convex glasses (16 to 20), Jaeger 6 well, Jaeger 4 with difficulty.

The operation of keratoplasty dates from 1824, when Reisinger suggested it, and made a few experiments on rabbits. Von Dieffenbach and others took up the suggestion with enthusiasm, the original operation was modified in various ways, and different instruments devised to facilitate it. The difficulties to be overcome were first clearly formulated by Marcus, viz., (1) perfect correspondence in size and form of the graft and the opening; (2) rapid transference of the graft; (3) ready fixation of the graft; (4) prevention of the inner parts of the eye from being pushed forward through the opening.

All the early attempts were without success, and the operation was gradually lost sight of. But, in 1872, by Power, and in 1877, by von Hippel, it was brought to light again. Their cases, however, were failures, and it was reserved for Sellerbeck, in 1878, to get the first successful result. His success, however, was only temporary, for, though the patient, on the fourteenth day, could read medium-sized writing, his vision failed by the twenty-first day, and five months later the graft was more opaque than the untouched areas. So once more the operation, as a means for the recovery of vision, disappeared, and was only employed in order to reduce ectatic corneal cicatrices and to produce more firm scars after severe corneal affections.

The success which Zirm has now achieved has lifted the operation finally into an assured place. But satisfactory results depend upon attention to so many details, and necessitate so much operative dexterity that it is probable that many more failures than successes will follow for a long time.

In seeking an explanation of the fruitlessness of the attempts hitherto made, Zirm considers that the causes have been mainly imperfect surgical technique and a want of correspondence in the sizes of the opening and the graft. Other causes, however, have had their share in the failure. *e.g.*, the habit of breathing on and of disinfecting the graft, the use of forceps and knife to loosen it, the employment of animal corneæ instead of human, and, finally, want of judgment in the selection of suitable cases.

The graft requires nourishment and protection from injurious activity on the part of the ocular fluids. The protection is obtained by preserving the investing cellular layers of the anterior and posterior surfaces of the cornea, especially the endothelium of Descemet's membrane. If this condition obtains and the graft fits accurately into the opening probably the apposing edges unite by a fibrinous layer within

a few minutes. The nourishment of the graft comes from the margin through the tissue fluids and the vessels, and slightly from the aqueous humour by diffusion. Therefore cases which are likely to be successful are such as have leucomata in which some remains of the original corneal texture, especially of the deeper portions, still exist. If the deepest parts are destroyed transparency will not continue, and therefore one should select cases whose leucomata are due to burns, to the action of lime, to severe pannus and to superficial ulceration.

In an appendix Zirm thus summarises the essential points:

1. The exclusive employment for the graft of human corneæ, if possible youthful corneæ, whose nutritive condition is favourable.

2. The exclusive employment of von Hippel's trephine, and instillation of eserine if the anterior chamber is present.

3. Deep anæsthesia, strict asepsis and the avoidance of antiseptics.

4. The protection of the graft until it can be placed in position, between two pieces of gauze moistened with sterile physiological salt solution and kept warm in steam.

5. The holding of the graft in its place by two threads drawn through the conjunctiva and forming a cross in front of it.

6. Selection of cases.

The operation may be used also to take the place of an iridectomy or an iridotomy in cases of central cicatrices following corneal ulcers; if necessary the graft can be cut and placed a little eccentrically.

D. MATHESON MACKAY.

TERSON (Père) and J. TERSON (Fils). **Subconjunctival Injections of Air in Ocular Therapeutics.** *Annales d'Oculistique*, February, 1907.

SUBCONJUNCTIVAL injections of sterilised air were first used by Koster, in 1901, who applied the treatment successfully in a case which was regarded as tubercle of the conjunctiva. He also treated two cases of tubercular iritis with success by the injection of air into the anterior chamber.

Chesneau attained considerable success in the treatment of sclerosing keratitis, probably also tubercular, by subconjunctival injections of air.

Encouraged by these reports, and more particularly by the

result of the first case in which he personally tried the method, in December, 1905, Terson has since that date extensively used subconjunctival injections of air in various corneal lesions—ulcerative or otherwise—accompanied by photophobia and pain and with little tendency to cure, and this without regard to their ætiological nature. The method of application is simple, and gives rise to no particular discomfort to the patient. Terson sterilises the air in the syringe by drawing it through the needle whilst the latter is heated to a red-heat in the flame of a spirit lamp. Koster, Chesneau and others attained the same purpose by aspirating through sterilised cotton wool. The eye having been cocainised, the lids are held open by means of the fingers; the needle of the syringe applied tangentially to the globe picks up the conjunctiva on its point, and with a little thrust is pushed 5 or 6 mm. under that membrane, and 1 or 2 c.c. of the sterilised air is injected. The bulbar conjunctiva is at once lifted up by the gaseous distension except where it may have become adherent through episcleral or circumcorneal inflammation; these adhesions, however, generally give way when the injections have been repeated once or twice.

The injections may be given every three, five or eight days, according to the rate of absorption of the air and the effect on symptoms. If the first is ineffective the second injection may be given within forty-eight hours.

The only complication observed by Terson has been subconjunctival ecchymosis from pricking a venule.

Of fifty-seven cases treated by the authors by injections, alone or combined with ordinary treatment, thirty-eight were corneal ulcers—eighteen marginal and twenty central—of spontaneous or traumatic origin, some of them complicated with iritis and hypopyon. Included in this number were three cases of fascicular keratitis. Thirteen were cases of keratitis without marked ulceration. Some were purely interstitial, but most of them were of the type of sclerosing keratitis.

The patients were of various ages, ranging from 16 to 70, but most of those suffering from marginal ulceration of the cornea were between 40 and 70 years of age. The sexes were about equally affected. Iritic complications were present in two-thirds of the cases in the female, and in one-third of the male cases.

The author is convinced that injections of air arrested suppurating ulcer of the cornea in three-fourths of the cases

in which that process was present, notably shortened the duration of the disease and reduced the cicatricial opacities to a minimum. They have a marked effect in relieving pain and photophobia, and many cases which do not respond to classical local and general treatment, improve rapidly on the same treatment after subconjunctival injections of air.

Koster was probably led to use subconjunctival injections of air in eye diseases as the result of the good effects recorded from injections of air, nitrogen, oxygen and carbonic acid in abdominal tubercle. Their exact mode of action in affections of the anterior segment of the globe is difficult to explain.

Terson does not lay much stress on a possible antiseptic action of the air, or upon the irritative action of the injection producing a flow of liquids and lymphoid cells towards the seat of injury, because the injection of air appears more effectual than the injection of solutions of sodium chloride or perchloride of mercury. As one of the first effects of the injections is the relief of photophobia and pain, he is inclined to think that they act through a salutary effect on the ciliary nerves, which are probably in a disturbed trophic condition in these diseases affecting the anterior segment of the eye. Cordier advanced a similar explanation of the relief of pain following injections of air in sciatica and neuralgias of trophic origin (*zona*, etc.), and thought it was due to the distension of the tissues producing elongation of the fine nervous ramifications at the point where they penetrate the dermis after having traversed the subcutaneous cellular tissue.

J. JAMESON EVANS.

WICKERKIEWICZ (Cracow). **Pyoctanin in Ocular Therapeutics.**

La Clinique Ophtalmologique, March 10th and 25th, 1907.

BOTANISTS have known for a long time that bacteria are killed as soon as their protoplasm has imbibed an anilin colour. The researches of Stilling and Wortmann appear to demonstrate that of all the anilin colours the violets have the greatest power of preventing infection or of arresting its progress. A 1 per cent. solution of methylene blue stains the conjunctiva, sclerotic and even the iris, the intact cornea alone remaining uncoloured. Besides methylene blue (*pyoctaninum caruleum*), auranine (*pyoctaninum aureum*) also possesses bactericidal properties,

but it has been less commonly employed. The troublesome discolouration of the fingers has no doubt militated against the popularity of these remedies, and attempts have been made to decolourize the pyoctanin, but experience has shown that it is precisely from its staining power that its efficacy results, and that its antiseptic value increases with the degree of that colouration. Stilling has shown that the bactericidal power of different anilin colours diminishes in going from the blue to the red end of the spectrum; this fact is probably to be associated with the diminution in therapeutic activity of the luminous rays themselves as we pass from the blue to the red.

In order that pyoctanin may exert its action it should remain some little time in contact with the infected tissues, and in order to increase its penetrating power in purulent processes Wickerkiewicz makes use of the well-known qualities of dionin in provoking intense lymphatic infiltration. The combined use of these two remedies has given him results much superior to those which he has seen after the employment of the other procedures recommended against suppurative processes of the eye.

The method of application is as follows:—After washing the globe and the conjunctival sac with normal saline solution the head of the patient is held well back, the lids are widely separated, and a freshly-prepared solution of pyoctanin, 1 in 500, is instilled drop by drop into the eye; with a little practice one can keep the anterior segment of the eye bathed in the solution for from one to three minutes without staining the fingers or the patient's cheeks; after having absorbed the superfluous fluid by means of cotton wool the cornea is examined to see if there are any lesions of the epithelium; such spots will be stained by the pyoctanin. Next, dionin is instilled into the eye, the strength of the solution employed being increased in the course of treatment on account of the well-known tolerance to its use; when strong solutions no longer provoke reaction powdered dionin is introduced.

In the case of ulcers of the cornea with hypopion the objective inflammatory symptoms are found to diminish rapidly, the instillations being made, if possible, twice daily; the ulcer soon begins to clear and cicatrise, the hypopion disappears and the pupil becomes large and regular. Pyoctanin in the above-mentioned strength does not cause pain or give rise to any disagreeable complications. With the help of the propulsive action of the dionin the colouration reaches the iris and

Descemet's membrane, at least in those places in which the epithelium has undergone pathological alteration; this colouration has generally disappeared when the reaction caused by the dionin has subsided. When the dionin, even in powder, has ceased to react the treatment ought to be interrupted, and, if the case requires it, re-commenced at the end of from four to six days.

Since the employment of this treatment in corneal ulceration Wickerkiewicz has not had a case of complete destruction of the cornea or of panophthalmitis. Some of the cases have been gonorrhœal in origin, and in such cases this treatment has proved superior to the use of protargol; he has also found pyoctanin and dionin most effective in deep-seated post-traumatic affections of the eye, even when of extreme gravity. Pyoctanin is also of great value in certain infected states of the globe and its annexes, especially in abscesses and empyemas. In the presence of empyema of the lacrimal sac, after irrigation with boric solution, he injects a solution of pyoctanin (from $\frac{1}{5}$ to $\frac{1}{2}$ per cent.), and then applies a compressing bandage; if there is a lacrimal fistula he first cures it and then injects the pyoctanin through it. He finds that affections of the sac thus treated are cured in a relatively short time, and he has had good results in cases where extirpation of the sac had been decided on.

Latterly he has also treated empyemas of the surrounding sinuses of the eye with pyoctanin, and has been rewarded with most striking results; he describes several of the more interesting cases, including one in which a frontal mucocele was cured without any other surgical treatment than pricking with a Pravaz needle. More recently in suppurations of the orbit, sinuses or lacrimal sac the injections of pyoctanin have been preceded by irrigation with hydroxyl solution. In affections of the conjunctiva he has had some success, although in acute trachoma he finds it inferior to the established methods at present employed. The staining of the hands resulting from pyoctanin can be got rid of by rubbing with chloric acid and afterwards rinsing in water.

Wickerkiewicz is thoroughly convinced that the curative and bactericidal properties of pyoctanin make it the antiseptic of choice in ocular therapeutics, and that it ought to be employed until the appearance of a remedy still more potent.

E. M. LITHGOW.

ZUR NEDDEN (Bonn). The Presence of Bactericidal Substances in the Eyes of Non-Immunised Individuals. *V. Graefe's Archiv*, lxx., 2.

THE work done by Römer and others on the power of immunisation in connection with the cornea and aqueous fluid suggested to the author an enquiry into the presence of bactericidal substances in the eyes of non-immunised animals under various conditions. He directed his attention to the aqueous and vitreous humours, employing rabbits as the experimental animals, and the dysentery bacillus as a suitable germ with which to study the process of bacteriolysis.

The method which Zur Nedden adopted was, put shortly, as follows:—The aqueous and vitreous fluids in different strengths were mixed with measured quantities of a diluted bouillon culture of the bacillus, and kept at a certain temperature for two hours. Agar was then introduced into each tube, and the whole poured into a Petri's capsule and placed in a chamber for growth. The colonies of the bacillus were then counted, their number being compared with that of a similarly treated portion of the bouillon culture of the bacillus that had not been exposed to the aqueous or vitreous fluid.

The results which he obtained showed that neither the aqueous nor the vitreous fluid possesses normally any bactericidal properties, although they hinder the growth of the bacilli *in vitro*; they do so even after having been subjected to a great heat, and he therefore concludes that these fluids are not such favourable media for the growth of bacteria as has often been supposed.

After paracentesis corneæ the bactericidal substances of normal blood pass freely into the aqueous, but they disappear from it again in a few hours. The bacteriolytic power of the aqueous was found to be even at its best a little lower than that of blood-serum. This was explained on the assumption that as the aqueous is being renewed a certain amount of these substances is absorbed, so that when the anterior chamber has become fully restored a certain portion of these substances has again passed away.

After puncture of the vitreous chamber these bactericidal substances appear in the vitreous, but more slowly than in the aqueous; on the other hand, they last much longer than in the

latter. Puncture of the vitreous chamber induced bactericidal properties in the aqueous, which varied in strength according to the amount of the vitreous extracted. No change, however, took place in the vitreous when the anterior chamber was punctured. The bacteriolytic properties of these fluids are not affected either by inducing a negative pressure around the eyeball or by passive congestion of the head. Subconjunctival injections of sodium chloride stimulate the flow of bactericidal substances into the aqueous (although not to the same extent as puncture of the anterior chamber), but produce no change in the vitreous. Inflammatory reaction induces a much greater flow into both chambers. The vitreous, however, shows an increased bacteriolytic action only when the inflammation is situated in that chamber, not when the latter is confined to the anterior parts of the eye. The aqueous, on the other hand, shows an increase in either case. As long as the inflammation is on the rise this power in the aqueous and vitreous remains high, but diminishes as the inflammation subsides.

In the human subject tests were made with the aqueous fluid as often as treatment by operative procedure allowed, and the results, so far as they went, coincided with those just described. It was found that in chronic inflammations the bacteriolytic power of the aqueous is weak, even when the inflammatory process has not yet come to a standstill. In the case of the vitreous, freshly-enucleated eyes were examined, but none of them showed any evidence of bactericidal properties.

In investigating the conditions in the cornea, Zur Nedden studied the *ulcus serpens corneæ*. The method he adopted here was to observe the appearance, staining properties, and power of growth, of the pneumococci taken from the undermined margin of a corneal ulcer at varying periods after a Saemisch's section, and he found that after such a puncture of the anterior chamber bactericidal substances pass from the blood-vessels at the limbus into the cornea, thereby causing the destruction of the germs. Herein lies, according to the author, the true explanation of the value of this operation. By diminishing the intra-ocular pressure and inducing a circum-corneal congestion it brings about a copious filtration of albuminous fluid to the point of least resistance in the cornea, *i.e.*, at the edges of the wound where the cocci are congregated. Hence a corneal section through the ulcer is of more value than a paracentesis done near the limbus.

As was mentioned above, the dysentery bacillus was employed

in these experiments, but the author is confident that his results would hold good for other bacteria, and he hopes soon to publish a paper on the practical application of these investigations in the treatment of infective processes.

THOS. SNOWBALL.

BÉAL (Paris). **A Special Form of Acute Conjunctivitis with Follicles.** *Annales d'Oculistique*, January, 1907.

IN considering the various forms of conjunctivitis in which follicles take a prominent part, we may conveniently group them thus:—First, those in which the follicle is an accessory or accidental feature, such as certain cases of conjunctivitis caused by the Koch-Weeks bacillus and the diplo-bacillus of Morax, Parinaud's conjunctivitis and tuberculous conjunctivitis; and, secondly, those in which the follicle is constant and of primary diagnostic value, such as trachoma and follicular conjunctivitis properly so-called. In the latter group Béal would include a variety which has occupied his attention and of which he has seen and carefully followed about sixty cases since January 1st, 1906.

From 1870, when Saemisch and Schweigger pronounced trachoma and follicular conjunctivitis to be separate diseases until the Moscow Congress in 1897, there were many prominent ophthalmologists who figured as unicists in the controversy. Since the latter date the individuality of these two diseases seems to have been almost unanimously acknowledged. The question which now occurs to one is: Has Béal provided material on which to launch another controversy as to the identity of his acute conjunctivitis with follicles and the ordinary follicular conjunctivitis? He certainly seems to have isolated to his satisfaction a conjunctivitis which is far from rare (fifty cases in a year), and which he considers quite unlike the ordinary follicular form, in its acute onset, short course and rapid cure. Briefly related, the characteristics of this new form of conjunctivitis are as follows:—Sudden onset of a feeling of dust in the eye, followed by slight lacrimation, injection and gumminess of the lids on waking next morning. In some cases the gumminess of the lids in the morning is the only subjective symptom. In very few cases was the onset noticed in both eyes simultaneously. Even when the disease is fully established the symptoms remain slight. The lids may show some œdema or puffiness, such as is seen in cases of

albuminuria, or, on the other hand, they may be quite normal, although the follicles are well marked. Actual blepharitis is seldom seen. The eye becomes watery and the bulbar conjunctiva is deeply injected, especially towards the periphery and to the inner and outer sides of the cornea where the palpebral fissure leaves it most exposed. The conjunctiva immediately surrounding the cornea remains white, and is seldom thickened or chemosed. No subconjunctival hæmorrhages were seen. The caruncle is little affected, but the semi-lunar fold is of a deep-red colour, much thickened and enlarged, reaching in some cases almost to the corneal limbus. On the tarsal conjunctiva and in the cul-de-sac are found the follicles. These follicles, which are accumulations of lymphoid cells, are from $\frac{1}{2}$ m.m. to 2 m.m. in diameter, some being oval in shape. Those growing in the tarsal conjunctiva are necessarily smaller, paler and less defined than those growing in the looser tissue of the cul-de-sac. In the latter region the follicles are oval, and have a tendency to fuse with neighbouring ones, thus forming ridges or bands which may extend from one side of the cul-de-sac to the other. When the follicles are present on both lids they are larger and more numerous on the lower, and if present on one lid only that one is invariably the lower. At the inner and outer extremity of the lid where there is no underlying tarsus the lesions have much the same appearance as in the cul-de-sac. The conjunctival secretion is very scanty and never purulent. The neighbouring lymph glands, generally the pre-auricular, but sometimes the sub-maxillary, are always enlarged to a moderate degree. The adenitis is of a mild nature, the glands being free from pain even on pressure. The cornea, iris and lacrimal passages remain normal throughout the disease.

Béal found a 1 per cent. solution of silver nitrate the most reliable treatment. One drop instilled twice daily brought about an immediate improvement and cured most of the cases in ten or twelve days, the treatment being continued until the follicles disappeared.

Béal examined all his cases bacteriologically, with negative results. He likewise inoculated the human conjunctiva with the secretion in three cases without producing the disease. He considers nevertheless, from the occurrence of several cases in the same household, that the disease is probably infectious, although we are ignorant of the exact conditions necessary for its transmission.

H. C. MOONEY.

ROLLET and AURAND (Lyon). **Experimental Study of Tuberculosis and Aspergillary Pseudo-Tuberculosis of the Choroid.** *Revue Générale d'Ophthalmologie*, January, 1907.

THE authors undertook two series of experiments in rabbits by inoculating the choroid with tuberculosis and aspergillosis separately. The infection was brought about directly in some, and indirectly, by injection into the vitreous, in others. Both *aspergillus fumigatus* and *flavus* were used.

The following are the conclusions drawn:—

1. Experimental tuberculosis of the choroid appears in two forms—one miliary (the true bacillary lesion), the other a disseminated choroiditis or chorio-retinitis (probably toxic in origin).

2. Experimental aspergillosis in the rabbit is always miliary, and the nodules, at any rate in their earlier stages, resemble closely those of tuberculosis.

3. The progress of tuberculosis, even after direct inoculation, is relatively slow, a minimum period of one month elapsing before lesions appear, and then they usually begin in the lower segment of the globe in an insidious fashion and without local reaction. The nodules generally remain isolated and retain their rounded form.

4. In aspergillosis, on the contrary, progress is much more rapid, and each nodule has a marked tendency to extend and form large irregular polygonal patches, but without local reaction.

5. Tubercle of the choroid may progress from behind forward to the anterior part of the uveal tract. It is not propagated backwards by the optic nerve.

6. Aspergillosis does not spread forward to the iris nor backward to the optic nerve.

7. Choroidal tuberculosis may cause the death of the animal, by hæmatogenic generalisation in the viscera, at the end of six months, but in pseudo-tuberculosis (aspergillosis) no similar result was observed.

8. In other cases of tuberculosis a cure is effected by the natural resistance of the animal, and cicatricial patches are left in the choroid.

9. Aspergillary nodules, in spite of their rapid growth, may begin to retrogress at periods between one and a half and four months after inoculation, according to the resistance of the

animal, and a cure may result without such evident cicatrices as in tuberculosis; sometimes merely a slight pigmentation of the retina is left.

10. Tuberculosis from indirect inoculation (through the vitreous) is not more serious than that produced by direct insertion into the choroid, but aspergillosis from the vitreous is always rapid and severe, and produces irido-choroiditis and retinitis, with dystrophic cataract and sometimes atrophy of the globe.

J. GRAY CLEGG.

J. CHAILLOUS. Traumatic Infection of the Eyeball by a Spore-forming Bacillus. *Recueil d'Ophthalmologie*, Nov., 1906.

A GARDENER, aged 38 years, received an injury to the left eye by a particle of soil striking his eye whilst he was digging. The exact nature of the particle was not known. Discomfort set in at once, and during the night following there was violent lancinating pain in the eye, and headache. In the morning the sight of the eye was found to be lost, the lids were swollen, the conjunctiva reddened and the cornea "white." During the day the severity of the pain diminished.

On the third day he came under observation. The right eye was normal. The left eye was in a condition of panophthalmitis. There was some pain, and tenderness on pressure, with some increase of tension. The lids were not so swollen as is usual in such cases. The cornea was covered with fibrinous exudate and insensible to touch. No mark of entrance of a foreign body could be seen. The conjunctival exudate showed many polynuclear leucocytes and some cocci.

A keratotomy was performed; no fluid escaped from the wound. The next day the eye was excised, and a week later the man left hospital.

The course of the infection was very rapid, but there were no clinical characters to distinguish it from other traumatic infections.

Microscopic section of the eye showed that the infection was mainly in the anterior parts of the eye in the ciliary region and iris; the lens was enveloped in exudate and its interior invaded. There were some lesions at the posterior pole, and there the retinal layers could not be distinguished.

Bacteriological examination. The exudate of the anterior

chamber showed, besides leucocytes and pigment granules, intra-cellular bacilli which stained well with Zhiel's fuchsine. Cultures made from this exudate produced colonies of the same bacilli with numerous isolated spores. They held Gram's stain. The bacilli were of variable size, from 10 to 12 μ long, and 3 to 4 μ broad, but in some cultures they attained to much greater size. The spores retained their vitality after exposure to 100° for ten minutes or 90° for one hour.

A comparison of the characters of this bacillus with *B. Subtilis* (the common "hay bacillus") was made, since Silberschmidt has attributed infections of the globe in field labourers to the latter organism. The organism found differed from the hay bacillus in being more slender, and tending to greater length. Both retained Gram's stain, and both formed spores. It produced clear transparent colonies on agar, and not opaque spreading growths like hay bacillus. In broth it produced flecks in the clear fluid and no surface scum, unlike the hay bacillus, which causes it to be cloudy in sixteen to twenty hours and forms both a sediment and scum. It did not liquefy gelatine, whereas the hay bacillus does so rapidly; it showed no growth on potato, on which the hay bacillus forms a greyish layer.

An elaborate series of inoculation experiments was carried out. Cultures were introduced into the anterior chamber of rabbits' eyes, producing a transitory hypopion, and into the vitreous, causing a rapid suppurative hyalitis; the spores were recovered from the vitreous twenty-two days later. Cultures were also employed which had been subjected to heat, 100° for ten minutes or 90° degrees for one hour. Twenty-three rabbits were inoculated with these cooked cultures, and in only three a positive result was obtained, the rest escaping. The same bacillus was regained from the eyes in these three cases, but also a Gram-staining coccus, so that the results were not quite conclusive.

N. BISHOP HARMAN.

H. VILLARD (Montpellier). *The Pathological Histology of Atropine Conjunctivitis.* *Archives d'Ophthalmologie*, January, 1907.

THE author excised a portion of the conjunctiva from the eye of a man *æt.* 60, who had used atropine for years to relieve the pains of a relapsing irido-cyclitis of sympathetic origin.

Under the influence of these repeated instillations there had supervened a typical atropine conjunctivitis, with an unusually abundant development of conjunctival follicles, especially in the lower fornix. A section examined with the low power of the microscope resembled a preparation of trachoma in that it showed numerous granulations more or less voluminous, comprised in the thickness of the conjunctival dermis and raising the overlying epithelium. The granulations were irregularly disposed, rarely confluent and especially numerous in the lower cul-de-sac.

1. *Lesions of the epithelium.* The cylindrical cells which normally constitute almost the whole of the superficial layer were largely, if not entirely, replaced by mucous cells. The deeper layer was easily distinguishable. In the intervals between the follicles the mucosa was flat and smooth. Furrows between adjacent follicles resembled in section tubular mucous glands. At the level of the follicles the mucosa changed its structure so much that with a low power it was difficult of recognition; in fact, the goblet cells had almost disappeared, and were replaced by others of varied forms, sometimes cubical, often flattened and stretched by the rapid growth of the nodule. The deep stratum practically preserved its normal characters. Between the two strata there were clear spaces filled by extremely numerous leucocytes, for the most part polynucleated. The change to mucous secreting cells may be regarded as a defence against the noxious action of the atropine.

2. *Lesions of the dermis.* (a) Superficial or adenoid layer. The leucocytes were here fewer than normal, in fact the layer barely merited the term adenoid, the white cells being congregated in the nodules and their immediate neighbourhood. (b) Deep or fibrous layer. This stratum consisted of thick connective-tissue bundles closely interlaced except where separated by the follicles. The blood-vessels were dilated and the lymphatics well developed and filled with leucocytes, for the most part mononucleated. (c) Nodules or follicles. These constitute the characteristic lesion, the anatomical signature, of follicular atropine conjunctivitis. In the sections examined they were of various dimensions, and were disseminated in the conjunctival dermis. They were usually well defined towards the base and the summit, but laterally they merged into irregular masses of leucocytes, as if constantly receiving accessions therefrom. The centre of the nodule was clearer than its periphery; it was formed by large pale cells with big nuclei.

Blood capillaries were present in the follicle, and the endothelial cells forming their walls were swollen and projected into the lumen. Very few polynuclear cells appeared in the follicles, or in fact anywhere else in the sections examined except in the epithelial layer.

In general the structure of the atropinic follicle resembles closely that of trachoma and follicular conjunctivitis.

J. GRAY CLEGG.

GALEZOWSKI and BEAUVOIS. Paralysis of the Sixth Cranial Nerve and Scleritis in Herpes Ophthalmicus. *Recueil d'Ophthalmologie*, November, 1906.

AFTER referring to some of the earlier observations of cases of this nature reported by Hutchinson, Hybord, Bowman and others, the authors give a detailed account of two cases which in recent years have come under their own observation:—

1. A lady of 75 years had left-sided herpes ophthalmicus. She had been for some time in poor health, and suffered many attacks of rheumatism. There was much pain, fever and sleeplessness with the attack. On the fifth day the eye became inflamed, there was intense photophobia and the lids were so swollen that examination of the globe was difficult. The cornea was clear, but had lost its sensibility; there were signs of iritis. Atropine was given morning and evening, but on account of fears for the nutrition of the cornea eserine was instilled at midday. On the eighteenth day the eye had improved, and the fundus oculi was seen to be normal. On the twenty-ninth day there appeared complete paralysis of the left external rectus muscle, and there was increase of pain about the eye. These disorders slowly resolved, and the patient was well in four or five months.

2. A man aged 82 years, after recovery from an attack of acute pneumonia, had an attack of herpes over the left frontal region; the eye was reddened, and there succeeded a conjunctivitis which it was thought might be pneumococcic. The cornea ulcerated and was anæsthetic, but no vesicles were seen. The iris and fundus oculi were normal, but the sclera was very congested. Then complete paralysis of the left external rectus set in. Hot bathing, compresses, atropine and quinine were used for treatment. Resolution was very slow, and although after eight months the diplopia had gone and the cornea was healthy, the scleritis persisted for more than a year.

These cases showed multiple disorders evidently in association and probably arising from one cause. Herpes ophthalmicus has been variously considered as (1) a peripheral neuritis; (2) a lesion of the Gasserian ganglion. To which of these views do these cases lend most support?

In considering how so many disorders could be directly due to a single nerve lesion the authors find an explanation in the many anastomoses between the first division of the fifth nerve and the sympathetic and oculo-motor nerves in the cavernous sinus, which were described in detail by Sappey.

After discussing cases reported by Weidner, Bowman, Gossetti, Sulzer, Drinand and Dauloz, they conclude that the effects and *séquelæ* of these attacks are too serious to be merely of the nature of a peripheral lesion. Phthisis, pneumonia, hemiplegia, general paralysis and death have all been reported as sequences of the attack; but on the point of gravity of prognosis the cases the authors quote are few and all disastrous, while they take no account of the comparatively large number of cases which occur in adult life, not infrequently as a consequence of some comparatively mild febrile complaint, such as coryza or influenza, where serious consequences to the eye are rare, and in which recovery is speedy. Even in such a case as I recently published, where the cornea was attacked and shrinkage of the lens followed, the general health was subsequently recovered.

N. BISHOP HARMAN.

URIBE Y TRONCOSO. **Ocular Filtration and the Pathogenesis of Glaucoma.** Second reply to the criticisms of Prof. Th. Leber. *Annales d'Oculistique*, February, 1907.

A CONSIDERABLE portion of this paper is concerned with the discussion of the purely controversial question as to whether the fact, that there is a considerable difference in the quantity of fluid injected into the anterior chamber and that which escapes by filtration by the canal of Schlemm, was first observed by Troncoso or by Leber and Pilzecker.

In this connection criticisms of Leber's manometer and his methods are made, but these have been previously noticed (*Ophthalmic Review*, 1905, p. 148).

Troncoso also reiterates his remarks on the effect on the rate of filtration of excess of pressure in the vitreous chamber over

that in the anterior chamber, and insists on the importance of maintaining the iris in the vertical position during the performance of experiments for estimating the rate of filtration.

In defence of his views on the rôle of albuminoid matter in the production of glaucoma the author has a good deal to say.

Leber finds that there is more albuminoid substance in the intra-ocular tissues in cases of inflammatory disease with minus tension than in glaucomatous eyes. Troncoso insists on the necessity for distinguishing hypertonic and hypotonic periods in these cases. If albuminoid substances are poured out in sufficient quantity there will be increased tension, except in the later stages when the ciliary body has undergone degenerative changes.

In plastic irido-cyclitis the inflammatory exudates are almost entirely parenchymatous, and the small quantity of free sero-fibrinous exudate poured into the aqueous humour and anterior part of the vitreous contains but little albumin. In these cases the attacks of hypertension are rare and fugacious because of the small amount of albumin in the aqueous and the re-absorption of exudation.

In the more severe forms which go on to atrophy the cellular infiltration extends to the ciliary body, choroid and vitreous, and becomes organised into fibrous tissue. Little exudate exists free, and what there is is spontaneously coagulable. Later, through shrinking of the vitreous and detachment of the retina and ciliary bodies, cavities are produced, and these become filled by albuminous transudation from the altered blood-vessels.

In serous irido-cyclitis, on the contrary, the free sero-albuminous and sero-fibrinous exudation is very abundant at the beginning, and renders filtration of the aqueous difficult and leads to deepening of the anterior chamber. In the later stages the vitreous may become opaque, soft and disorganised and the globe atrophied. In these cases there may be a large amount of albuminous fluid in the eye, but owing to inadequate secretion of aqueous and lessened sero-albuminous exudation as the inflammation subsides little of albumen not spontaneously coagulable gets dissolved, and the tension consequently keeps low.

The following conditions are necessary for the maintenance of hypertension:—

1. That the physico-chemical change in the aqueous, which renders it filtrable with difficulty and so gives rise to hypertension, be maintained.

2. That the channels of filtration remain permanently obstructed by the obliteration of the canal of Schlemm or the adherence of the root of the iris to the corneo-scleral reticulum.

3. That the liquid currents of the eye, and especially the secretion of aqueous humour, be conserved.

These conditions co-exist in chronic inflammatory glaucoma before the atrophic stage, but not in eyes becoming atrophied from uveitis, etc.

Hydrostatic pressure is necessary for physical filtration, and if that pressure does not exist and the ordinary excretory channels are absent the intra-ocular fluids will establish an osmotic equilibrium with the fluid in the blood-vessels and the ocular tension will remain subject solely to the changes of osmotic tension of the blood.

J. JAMESON EVANS.

VON SIEGRIST (Bern). **Evisceration and Enucleation of the Eye under Local Anæsthesia.** *Klinische Monatsblätter für Augenheilkunde*, January, 1907.

IN this article the writer describes his method of producing local anæsthesia in excision and evisceration, which he considers is more efficient and less harmful than any methods that have been previously adopted. He states that it renders either operation practically painless. For some years past he has made use of a glass syringe with a curved needle, with which he makes four injections of a 2 per cent. solution of novocain, with a little adrenalin added, well into the orbit, entering over the position of each rectus muscle. First of all the conjunctiva is well anæsthetised with a 2 per cent. solution of cocaine with adrenalin. He then seizes the conjunctiva and capsule over a rectus muscle with fixation forceps, rotates the eye in the opposite direction, and then inserts the needle of the syringe (with the curve towards the globe) through the conjunctiva as far back as possible into the tissue behind the eyeball well back into the orbit and injects a sterilised 2 per cent. solution of novocain to which has been added a little adrenalin. This injection is rapidly repeated in the other three positions mentioned, and after two or three minutes the

operation is begun. This is completed, the writer says, without the least pain and without any ill-effects. It is claimed for this method that it is simple, efficient, producing complete anæsthesia, whether the eye is inflamed or not, and that there is very little danger of any toxic effect.

CHARLES BLAIR.

GRIMSDALE and BREWERTON (London). **Text-Book of Ophthalmic Operations.** London: Kegan, Paul, Trench, Trübner and Co., 1907.

MESSRS. Grimsdale and Brewerton have done an excellent piece of work. In the ordinary text-books on eye diseases the description of operations is as a rule somewhat meagre, as indeed is quite right and proper, because the reader is probably a person who may never perform any such; and when operations are described those are selected which the author favours, and others, which may be every whit as sound in principle and as effective in practice, are omitted. The authors of this book give, however, a more complete account of the various methods of procedure, with more precision in the carrying out of the details. It cannot have been a very simple matter to arrange the numerous modes of operation, often differing but slightly from one another, in reasonable order, but the authors have succeeded well, and while they do not even profess to include every operation that the wisdom (or unwisdom) of man has devised, the authors have not, so far as we have observed, omitted any of real importance. Naturally every surgeon in the land would have done the work differently from every other, for he would have dwelt more lovingly on his own methods and dealt less fully with those of which he thought less highly, so one must not complain of the authors' conduct in this matter; their offence, if they have committed one, is only human.

Each section of the book begins with a brief account of the part of the eye about to be dealt with and the structures involved, and with a few general remarks upon the series of operations; and each concludes with exact references to the original description by the inventors of the various methods described.

The diagrams, which are numerous, are very instructive, and help out the description admirably; and everyone who has

ever tried it knows how hard it is to describe the steps of an operation without the aid of a sketch. The only quarrel we have with the diagrams is that (if one were to judge from them alone) all the instruments employed seem to be of the coarsest possible structure and the stitches made of parcel-cord.

We confidently predict that this book will be found of great value by ophthalmic surgeons, especially by those who are still young enough or wise enough to desire to learn something from the experience of others.

A. DARIER (Paris). *Leçons de Thérapeutique Oculaire*. Third Edition, Paris. *La Clinique Ophtalmologique*, 1906.

THE third edition of Darier's work contains a good deal of fresh matter, to make room for which those lectures dealing with the treatment of diseases of the iris, retina and optic nerve are omitted, or rather postponed until the publication of a new volume. The new matter deals partly with such subjects as the new local anæsthetics, the serum treatment of infective corneal ulcers and the new tuberculin treatment in relation to the opsonic index; partly it discusses more fully subjects already dealt with in the first edition; but the book remains chiefly remarkable for its enthusiastic advocacy of three methods of treatment, viz., subconjunctival injections, the new organic salts of silver and the drug dionine.

With regard to subconjunctival injections, experiments are referred to which tend to show that they act by causing a reflex hyperæmia of the ciliary body which increases the amount of albumen secreted into the aqueous, and along with it the protective substances which antagonise toxins. Darier himself is inclined to lay more stress on the direct local action of the drug injected, and in serious cases of hypopion ulcer, for example, finds the injection of 1:1000 cyanide of mercury considerably more efficacious than that of salt solution. The pain which follows these injections can, he maintains, be wholly prevented by the addition of a 1 per cent. solution of acoin. Unfortunately this is not the experience of some others who have tried it, and it is probably owing to the pain generally produced that the treatment by subconjunctival injection has not been more extensively tried in England.

The treatment of all forms of conjunctivitis by the organic salts of silver is fully dealt with, and a new chapter is devoted to the virtues of argyrol. Whereas in the first edition protargol

was the drug chiefly recommended, as being far less painful and irritant than the nitrate of silver, in this edition argyrol is recommended as being equally efficient and quite painless, though protargol remains the most useful drug for the special purpose of disinfecting the cilia and edges of the lids in virtue of its property of forming a lather which can be vigorously applied. It is in the treatment of purulent ophthalmia that the choice between the various drugs becomes of most serious importance. There is this great advantage in having an antiseptic as non-irritating as is argyrol,—that it can be safely employed at hourly or half-hourly intervals by the nurse without any fear of doing injury. For nitrate of silver Darier has hardly a good word to say, but even he admits that in cases which do not improve in a few days under argyrol or protargol it may legitimately be employed by the surgeon, though he himself has never done so for the last eight years, having found the less irritating silver compounds sufficiently effective.

With regard to dionine, a good deal of credit belongs to Darier for making this drug more generally known. Owing to its action in dilating the lymph channels it is now fairly widely used to promote absorption of any recent exudation, and its power of relieving many cases of deep-seated ocular pain is undoubted. Darier calls it the “physiological antiseptic *par excellence*” in virtue of its power of flushing the conjunctival and corneal lymph spaces, and perhaps the intra-ocular ones also, with a lymph bath. For this reason its employment is recommended along with the other measures in infective corneal ulcers.

The book is written from too individual a point of view to be a sufficient text-book for students, but it is interesting, and should be found stimulating by all those who have some experience of the subjects with which it deals.

A. H. T.

Die Bakteriologie in der Augenheilkunde. By Prof. THEODOR AXENFELD.

THE rapid increase in our knowledge of the bacteriology of the eye, together with the diversity of language, and the number of periodicals in which that knowledge is recorded, have made it increasingly obvious that a text-book of ophthalmic bacteriology must soon appear. The need was to some extent supplied in Kolle and Wasserman's “Handbuch der pathogenen Mikro-organismen” by Axenfeld's article on the “special

bacteriology of the eye;" but this work is only available to a limited number of readers, and it is therefore with much satisfaction that we see appear "Die Bakteriologie in der Augenheilkunde," by the same author.

Professor Axenfeld has critically reviewed and digested every article which has appeared on this subject down to the end of 1906, and has arranged the information thus obtained systematically under the following headings:—The Normal Conjunctiva; The Lids; Wound Infection; Conjunctivitis; Infections of the Lacrimal Sac; Infections of the Cornea; Leprosy, Tubercle and Syphilis of the Eye; Endogenous Infections of the Globe; Orbital Infections. Prefacing the whole is an admirable chapter on the methods of conducting bacteriological examinations. The fullest references are given, which when tested upon various points invariably furnished the original article.

It would be impossible to go into all the points of excellence which are presented in this work; the chapter on the normal conjunctiva and the presence therein of the staphylococcus and xerosis bacillus is a masterly analysis of the situation. On wound infection the moderation of Prof. Axenfeld's views is a true reflex of the latest work on this subject. The articles on the specific forms of conjunctivitis due to the Koch-Weeks bacillus, the diplo-bacillus, the pneumococcus, etc., are perhaps the most interesting and instructive in the whole volume.

The amount of space devoted to the cornea appears less than the importance of the subject demands, and indicates how small our knowledge of this region really is. The author here has wisely restricted himself to those facts which have been proved beyond a shadow of doubt.

Under the heading "Tuberculosis" we find a careful and valuable statement of the position regarding the serum treatment, and under "Syphilis" some very interesting work on *spirochaeta pallida*.

The book is well printed, the figures, with the exception of some of the micro-photographs, are excellent, and the coloured plates a triumph of the art of reproduction.

It is a volume which everyone, who would either work himself at the subject or appreciate what has already been done, will read with great interest and profit.*

ANGUS MACNAB.

* We understand that an English translation of this excellent book is now in course of preparation.—ED.

ANGUS MACNAB (London). **Ulceration of the Cornea.** Baillière, Tindall and Cox, 1907.

IF there is nothing absolutely new in this little book of 170 pages, at least all the knowledge most recently acquired regarding this most important subject has been gathered together and presented in a very readable, plain, clear style. The author is thoroughly well read in all recent literature, particularly Teutonic literature, regarding the pathology of ulceration of the cornea, and treats of the matter in the manner of one who knows his subject familiarly. Like a certain Lord Chancellor, now deceased, he seems to be troubled by no doubts, and some of his readers who are in the daily habit of dealing with cases of affections of the cornea will be amused by his dogmatic assertions in regard to the only proper treatment of the various forms. For example, in regard to the use of atropin in "pneumococcal ulcer," the name which the author considers we are now warranted in using in preference to *ulcus serpens* or *hypopyon ulcer*, he advises that even if the tension rises the drug should be pushed, and paracentesis or iridectomy performed to prevent or remedy the ill-effects of the therapeusis. This procedure will not commend itself to all practising surgeons, though some may agree. But Mr. Macnab does not seem to be aware that there is room for any difference of opinion.

A very useful chapter at the end of the book is that dealing with the recognition of such organisms as are found in ulcers of the cornea, with advice as to tests for their identification. This ought to prove of great service to house surgeons and others who have not had very extensive opportunities to study the special organisms connected with the eye, and yet are called upon to make a bacteriological test. The last chapter of all deals with excision of the sac, Saemisch's section, the removal of material from an ulcer for examination (a point which should have been included in the previous chapter), and with what the author calls the "corneal plastic operation." This is not the correct name for the method introduced largely by Da Gama Pinto (whose name is not mentioned,—he not being a German); the term corneal plastic operation ought to be reserved for the transplantation of cornea. In regard to the removal of material for examination, the author does well to state plainly that this should always be immediately followed

by active treatment of the ulcer, as the procedure itself may easily cause further advance of the disease.

While the general style is pleasant and flowing, the pedantic reader is annoyed by certain recurring mistakes; there is no justification, for example, for spelling *mucocoele* *mucocœle*, and *blennorrhœa* ought not to be written *blenorrhœa*; Priestley Smith's and Uhthoff's names are misspelt on each occasion; for prolapse of Descemet's membrane the awful word *descemetocœle* is coined. It is to be hoped that these minor errors will be corrected in a subsequent edition, for the little brochure is one which will bring credit to its author.

WIKTOR REIS (Lemberg). **Primary Tuberculosis of the Conjunctiva Bulbi.** *Klinische Monatsblätter für Augenheilkunde*, February 7th, 1907.

AFTER commenting on the rarity of tuberculosis of the ocular as compared with that of the palpebral conjunctiva, Dr. Reis cites the following case:—

A girl of 16 years was admitted to the Lemberg Eye Clinic in April, 1906, with a tumour of the size of a pea on the nasal side of the globe. The conjunctiva over the growth was movable, but much congested. The neighbouring lymph glands were not enlarged, and medical examination revealed no signs of disease in internal organs. The tumour could not be entirely removed owing to the extent to which it involved the sclera. The disease recurred after operation, but the patient would not submit to further operative treatment, and left the hospital. The subsequent history of the case apparently could not be ascertained. Before she left the hospital numerous vitreous opacities were observed, but no other changes could be made out with the ophthalmoscope. Intra-peritoneal injection of a guinea-pig with excised portions of the growth produced typical tuberculosis of the mesenteric glands. Histological examination of other portions of the growth revealed the characteristic appearances of tubercle. Tested with an injection of 1 mg. of Koch's tuberculin the patient showed a distinct febrile reaction, while at the same time there was observed some local reaction in the shape of conjunctival redness and swelling.

Dr. Reis has been able to find accounts of ten cases of the same disease observed by others. From these it appears that tubercular disease in this situation shows a tendency towards the formation of a slow-growing tubercular tumour, while the spreading ulcerative processes so commonly seen in tuberculosis of the palpebral conjunctiva are very rarely observed. After a stage of infiltration and growth a necrotic process begins in the centre of the tumour mass, the overlying conjunctiva eventually gives way, and the caseous necrotic tissue escapes. The raw surface left becomes covered with pale unhealthy granulations.

In most of the cases there was evidence of tubercular disease elsewhere. Treatment seems to promise a fair chance of success, four of the cases showing no recurrence of the disease at periods of four to seven months after removal of the growth.

Dr. Reis thinks that in the case cited it was probably ectogenous, as a sister of the patient was in the last stages of phthisis. The healthy uninjured conjunctiva is no doubt secure against the attack of the tubercle bacillus; Fuchs's view is that at the time of infection with tubercle the conjunctiva has to be scratched or abraded by the foreign body carrying the virus. In cases with pre-existing tubercular disease of other organs the infection may perhaps be endogenous.

J. V. PATERSON.

CLINICAL NOTES.

TREATMENT OF TRACHOMA BY RUBBING WITH BORIC ACID AND PROTARGOL.—E. Temple Smith (Charters Towers, Queensland), having treated trachoma by various methods, has obtained greater success with the following than with any other:—Cocaine is first applied. Absorbent wool twisted round the tip of a metal or wooden carrier, such as an ordinary match, is soaked in 25 per cent. solution of protargol and then dipped into boric acid, so that it is coated over with the powder. The eyelids are everted, and a swab is rubbed over the whole surface of the palpebral conjunctiva until bleeding is produced. This causes a uniform scarification of moderate degree, which while admitting the access of the protargol to the diseased structures, is little likely to produce injurious scarring. The treatment is repeated daily. The greater the vascularity of the lids the greater the indication for the boric acid. As the

lids get smoother the protargol may be rubbed in alone, or only occasionally with the aid of the boric acid. Protargol is better than silver nitrate because it is painless, and it is equally effective. Its action is greatly promoted by the simultaneous use of the boric acid.—*Australasian Medical Gazette*, December 20th, 1906.

UNILATERAL OPIHTHALMOPLÉGIA INTERNA.—Bramwell and Sinclair report several cases of this condition, and discuss its relation to syphilis and to other present or prospective nervous symptoms. They consider that it is "probably almost always an indication of previous syphilis" (but in three of their six cases there was no evidence of this!); and they place it in this respect on much the same level as the Argyll-Robertson pupil, indicating that there has previously been syphilitic infection and that this has attacked the nervous system. When found during the examination of patients who claim compensation after injuries, or of persons seeking to insure their lives, the existence of the symptom may from different points of view have much importance.—*Scottish Medical and Surgical Journal*, December, 1906.

SPRING CATARRH.—Gradle (Chicago) has employed Dunbar's pollantin in spring catarrh, and has obtained good results. His cases are as yet too few, as he admits, to justify him in making any general assertions, but so far he has been pleased with his results. He was led to use pollantin by observing a certain analogy between spring catarrh and hay fever.—*Ophthalmic Record* (Chicago), November, 1906.

CYSTICERCUS OF THE IRIS.—Rembe (Chicago) has had the unique experience of diagnosing cysticercus in the iris, and of removing the parasite and leaving the patient with full vision. The patient was a boy of 7, whose iris, especially at the lower part, became greatly inflamed, and showed a small cyst-like growth in that situation. This cyst was transparent at its upper part, but showed an opaque yellowish body below; in all it was about 4 m.m. in length. It was crossed by several bands, and showed leech-like movements from one end to the other. Under chloroform he made a section and removed almost the whole growth; the rest became quickly absorbed, and the patient regained practically normal vision.—*Ophthalmic Record*, January, 1907.

CORNEAL LESIONS IN SNOW-BLINDNESS. Early in 1905, when examining a patient affected with snow-blindness, Strader

(Cheyenne, Wyoming, U.S.A.) noticed a slight lessening of the lustre of the cornea, and on using fluorescein satisfied himself that over a narrow band corresponding to the palpebral aperture there was erosion of the cornea. This patient and two others suffering in the same way were all cured after simple local treatment for one day, with boracic lotion and bandage. Under no other method of treatment has he secured a cure in such a very short time in snow-blindness. It seems, from enquiries which he made, that a similar observation of loss of the epithelium was recorded by Giffard (Omaha) and Graddy (Nashville, Tennessee). It is usual among writers to regard snow-blindness as a retinal lesion, and any blepharo-spasm, etc., which may be present as purely reflex.—*Ophthalmic Record* (Chicago), November, 1906.

ANIRIDIA—EXTRACTION OF CATARACT.—Dennis (Erie, Pennsylvania) reports having extracted cataract in a young man, the subject of this rare malformation. The patient had nystagmus and increased tension in both eyes, with a slightly cloudy cornea on the left side. The lens of the right eye was totally opaque and that of the left partially so. There was "total absence of iris and ciliary bodies in both eyes." (?) Extraction was not complicated by any loss of vitreous, but tension rose above normal two weeks later, necessitating the use of eserine; this brought it down again. After needling the tension remained down, provided eserine was not too long withheld. Vision obtained with +14 D was $\frac{6}{60}$. As Dennis remarks, the explanation of the beneficial effect upon the tension of the use of eserine is not easy, especially if one accepts his statement to the effect that the ciliary body was entirely absent,—an observation somewhat difficult to prove beyond cavil in the living eye.—*American Archives of Ophthalmology*, xxxv., 6.

THE HISTOLOGY OF IRIDECTOMY.

THOMSON HENDERSON, M.D., Nottingham.

THIS is a subject which has been neglected altogether by investigators and writers on the pathological anatomy of the eye, and yet it is one, a study of which brings out most important facts bearing on the physiology and pathology of the eye.

For statistical purposes I have confined myself in this paper to the same series of 33 cases referred to in my recent paper on "The Healing of Wounds after Cataract Extraction." * (Table I.)

THE IRIS STUMP.

The length of the iris stump forming the base of the coloboma depends to a great extent on the position of the incision, for the more peripheral this is made the smaller is the portion of the iris periphery left behind. The average breadth of the iris ring is 4·5 mm., and of this from three-fourths to four-fifths is removed in performing iridectomy preliminary to extraction of cataract.

In my series of cases the average length of the iris stump after the modern flap incision was 1·06 mm. After the more peripheral Graefe's section the size of the iris stump in no case exceeded 1 mm., the average being ·74 mm. (Table I.)

In the great majority of the cases the base of the coloboma was cut obliquely, so that the anterior surface of the iris stump projected beyond the posterior (Figs. II. and IV.). On first thought this might be ascribed to the action of the unopposed dilator pupillæ, but this supposition is negatived by the fact that in those cases in which the dilator

* *Ophthalmic Review*, May, 1907.

has been torn, or pulled out altogether, the same phenomenon was still present. This appearance must therefore be ascribed to the way in which the iris is cut, pulled upwards as it is through an oblique opening and then cut tangentially to the corneal surface.

In performing an iridectomy it is not only that part of the iris that is seized and pulled through the incision that is subjected to traction, but the whole iris system is put on the stretch and feels the resulting strain. For as the pupillary margin is drawn upwards by the forceps a strain is transmitted to the whole circumference of the sphincter pupillæ as well as to the ciliary attachment of the iris periphery. The consequence of such a strain on a frail structure like the iris is that ruptures of its surfaces both anterior and posterior, at the root of the iris stump forming the coloboma as well as in the rest of the iris circumference, are commonly met with, generally accompanied in early cases by minute extravasations into the iris stroma.

It is one of the most striking features exhibited by the healthy iris after iridectomy that its tissue can show under the microscope the most extraordinary amount of trauma without any manifestations whatsoever of subsequent reaction. It appears, and it is a peculiar and hitherto unrecognised fact, that the iris tissue is absolutely indifferent to trauma as such, so long as it is not subjected to toxic or septic agencies. Under normal circumstances, the iris tissue undergoes no reparative processes, no scar is formed when its tissue is divided or torn, no connective tissue is laid down when it is pulled out of its attachment to the ciliary body and no reaction follows hæmorrhages into its substance. With the single exception of the absorption of extravasations the iris tissue appears years after an iridectomy exactly as it did immediately after its performance; for the

cut surface remains as when first severed—the so called anterior endothelium having no tendency to cover it, or the pigment layer to grow over it, and no wandering cells cover its surface with connective tissue. In short the severed iris tissue forming the base and pillars of the coloboma always remains an open, raw, and unhealed area, in free and open communication with the aqueous of the anterior chamber (Figs. I., II., III. and IV.).

THE ANTERIOR LIMITING MEMBRANE.

The anterior surface of the iris is said to be covered by a continuation of the endothelium which lines the posterior surface of the cornea. This description, universally accepted, my investigations do not lead me to support, as in my opinion the flattened cells forming the so-called anterior endothelium are only the superficial layer of cells of the anterior limiting membrane, which latter is but a condensed stratum of the connective tissue forming the iris stroma.

The term endothelium was first used by His to designate an epithelium-like tissue of mesodermic origin—a term which, while useful, Schäfer objects to if pushed to its logical conclusion, as tending to create an artificial separation between cells of the same elementary tissue. This objection is specially applicable in the case of the cells lining the anterior chamber.

The iris is not the only tissue in the body in which the connective tissue on its superficial aspect takes on an epithelioid appearance. Describing the flattened or lamellar cells of connective tissue in general, Schäfer (Quain's Anatomy, p. 231) says, “the cells in some parts are united by their edges into patches, after the manner of an epithelium; in other cases, a union takes place by means of

branched processes, so that the cells form a kind of network throughout the ground substance. In many membranous forms of connective tissue" (*inter alia*, the iris) "the flattened cells form an epithelial-like covering to the surface of the membrane and may even complete the latter by bridging over any gaps existing between the bundles of fibres forming the membrane. Such epithelioid tracts may be of considerable extent. It is often observable, that the cells at the margin of the patch have processes at their free border, which are connected with the ordinary scattered cells of the tissue."

This description of the general connective tissue of the body is applicable in every way to the iris stroma as a whole and its anterior aspect in particular. The anterior limiting membrane of the iris is composed of a condensed layer of cells of the connective tissue stroma, and the so-called endothelial layer is nothing more than its superficial layer of flattened out connective tissue cells arranged close together, edge to edge. In this manner are formed areas in which, it is true, patches of cells present an epithelioid appearance, but the cells in question exhibit every transition to the other cells of the connective tissue stroma, a fact which is most evident where they bridge over spaces and holes and where they approach the openings of the iris crypts of Fuchs.

The posterior corneal endothelium is a protective layer preventing the entrance of fluid into the corneal parenchyma, and it is also responsible for the formation of Descemet's membrane, which is laid down by a process of secretion or deposition. If the superficial layer of cells on the anterior iris surface were a direct continuation of the posterior corneal endothelium one would expect them to lay down a homogeneous membrane analogous to Descemet's membrane. Such a homogeneous membrane is never found

in the normal iris. Pathologically, however, in glaucoma, when the iris has not only become atrophied, but has formed a peripheral anterior attachment, the dominating activity of the posterior corneal endothelium asserts itself, so that it spreads over the iris surface, and in its progress lays down a homogeneous membrane. This will not, however, occur without glaucoma and subsequent iris atrophy, for in ordinary traumatic or post-operative synechiae, even of old standing, the endothelium never spreads over the iris surface.

But further, as first shown by Peters, and well illustrated as regards the human eye in my recent paper, the posterior corneal endothelium is very prompt in covering over defects in its continuity, so that the inner aspect of a corneal wound is readily sealed by a growth of endothelium, but as stated above the cut iris tissue manifests no reparative processes and its severed surface does not, even years after become covered by its so called endothelial layer which it would certainly speedily be if this layer were a continuation of, and of the same nature as the posterior corneal endothelium. It is therefore on morphological, physiological and pathological grounds that I base my conclusions that the posterior corneal endothelium does not cover the anterior iris surface, but that these two layers are absolutely distinct in structure and function.

EXTRAVASATIONS AND LACERATIONS.

It is a clinical observation of long standing that little or no hæmorrhage follows iridectomy on healthy iris, though, as might be expected, on making microscopic examination in early cases minute extravasations at or near the cut surfaces are not infrequently to be met with as late as two or even three weeks after operation, showing

what a long time blood in this position takes to be absorbed (Fig. II.). These minute extravasations are not, however, limited to the cut surfaces of the iris, but they are also to be met with at the attachment or root of the iris stump, as well as at a corresponding point in the iris ring inferiorly. While much more constant if the iris tissue had been torn, yet the extravasations were also present in the latter position without any other marked signs of trauma, arising, perhaps, simply as the result of the stretching of senile and inelastic capillaries. Hæmorrhages at the ciliary attachment of the iris root—either superiorly or inferiorly—were present in five cases. The extravasation sometimes extended along the anterior aspect of the ciliary body but never deeply into its substance. Another position where hæmorrhages were of even more frequent occurrence was in the pupillary portion of the inferior half of the iris ring. Here the extravasated red blood corpuscles lay always just external to the sphincter pupillæ, though occasionally with this was associated some extravasation lying on the surface of that muscle. Extravasations in this position were present in seven early cases (Table II.) varying in date from 3 to 22 days after operation. These seven cases include the five above mentioned where hæmorrhage was present at the iris attachment. In Fig. V. this was associated with an actual dislocation of the sphincter from its bed. Between the external margin of the sphincter pupillæ and the iris root in no case were extravasations met with.

Tears and lacerations of the iris were found without exception at the ciliary attachment of the iris and varied from slight ruptures of the anterior surface to partial or complete detachment (Figs. III. and IV.). Such changes were found not only in the stump superiorly but also in

the rest of the iris circumference. A most frequent form of partial detachment, which is to be met with especially at the base of the coloboma, is rupture of the dilator pupilæ. This was broken across in five cases (Fig. IV.) while in two others the dilator and posterior pigment layers were completely detached, leaving the iris stump denuded altogether of its posterior layers (Fig. III.) and this without apparently causing any disturbance either clinically or histologically. In three further cases the iris at the site of the coloboma had been detached completely from its ciliary attachment and, in one of these, irido-dialysis was present. The ciliary body in these cases in which the iris had been torn off showed no signs of cicatrix, proving that in this respect it reacts, or rather shows the same lack of reaction, to simple trauma as the iris itself.

CILIARY AND CHOROIDAL DETACHMENT.

Prof. Fuchs (Graefe's Arch., Vol. 53) points out that these rents and lacerations at the iris root produce a free and open communication between the fluid in the anterior chamber and the tissue of the ciliary body, leading to aspiration of fluids into the supra-choroidal space, and to detachment of the ciliary body and choroid. This result, he states, is contributed to by advanced age of the patient, and consequent increasing rigidity of the sclera, and by the section being made with a Graefe's knife, whereby the sclera is dragged upon at the time of operation. Prof. Fuchs found that clinically detachment of the choroid is met with chiefly at the temporal and nasal sides; while detachments above and below are rare, and only met with in conjunction with lateral ones. I found this condition present in eight cases out of my series of 33 (*vide* Table

III.), all of which with one exception—Case iii.—were sectioned vertically and they all show more or less extensive detachment of the ciliary body and choroid, superiorly as well as inferiorly. These cases include the four the pathological condition of which has been so carefully described by Prof. Fuchs, to whom indeed I am indebted for the greater part of my material. The most extensive detachment was present in a case of Mr. Richardson Cross (Fig. VI.), in which the serous exudate filled the supra-choroidal space as far back as the equator of the eye. This was a case of most successful simple extraction, in which however, owing to a down-growth of the surface epithelium, there was a fistulous condition of the wound, and hence diminished intraocular tension. The patient died 28 days after operation.

The difficulty of accepting Prof. Fuchs' explanation of aspiration into the supra-choroidal space lies in the fact that, as pointed out above, the cut surface of the iris, forming the base and pillars of the coloboma, always remains an open raw wound, which offers a very much larger absorbant area than the minute rents and lacerations of the iris, consequent on the operation of iridectomy.

The principal symptom of this serous detachment of the choroid is a shallow anterior chamber, the result of delay in the re-establishment of the intra-ocular tension caused by a leaking wound. The fluid collects in the supra-choroidal space in consequence of the veins of the ciliary body ("which of all the structures of the eye possesses the most veins," Fuchs) having lost their normal support, and the detachment is simply a passive collection or stagnation of fluid.

The speedy disappearance of this serous fluid, on the

restoration of the normal intra-ocular pressure, is also another factor pointing to the physiological nature of this form of detachment and disproving its traumatic origin.

THE POSTERIOR PIGMENT LAYERS.

The posterior pigment layers under normal circumstances play the same passive part after iridectomy as the other structures entering into the formation of the iris, for as already mentioned they have no tendency to grow over the wound surface. The pars iridis retinæ is in fact never regenerated and remains in the same state years after iridectomy as immediately subsequent to the operation. It is, under normal conditions, never replaced if rubbed off by the lens in the act of extraction, and similarly when the iris stump is pulled out from its attachment, leaving the anterior part of the ciliary body bare, this denuded surface shows no more signs of cicatrisation than the iris tissue itself, for no connective tissue is laid down, and the pars ciliaris retinæ does not grow over the rent surface.

CONCLUSIONS.

The severed iris tissue after iridectomy never shows any signs of scar, or other manifestations of reaction, for, even years after, the cut surface appears as if the operation had been performed post mortem.

Cicatrization in general is the expression of the reaction of the tissues to trauma and irritation. It is in fact a defensive and protective bulwark arising from the altered relationship and surroundings of the tissue affected. In the case of the iris, however, there is a peculiar and unique state of affairs, as here the tissue concerned is

composed of a vascular layer of loose connective tissue which is bathed and surrounded by lymph; a simple trauma therefore, such as iridectomy, does not in itself alter the relation of the severed tissue-cells, either to each other, or to their normal surroundings, so that there is no stimulus to cause the cells to hypertrophy and lay down a dense and protective layer. When, however, a stimulus is supplied by toxic or other agents cicatrisation and sclerosis of the iris tissue follows in the same manner and governed by the same principles as elsewhere in the body.

TABLE I.

Case.	Period after Operation.	Distance of inner margin of Incision from Posterior End of Schlemm's Canal.	Length of Iris Stump.
MODERN FLAP INCISION.—			
XXXII.	4 years.	2.66 "	1.33 mm.
IX.	13 days.	2.23 "	1.7 "
XXII.	Healed.	2.2 "	Nil—torn out.
II.	3 days.	2.17 "	.93 mm.
XXXIII.	4 years.	2.1 "	1.2 "
I.	3 days.	2. "	1.33 "
XXV.	Healed.	1.8 "	Nil—torn out.
XXVII.	Healed.	1.8 "	1.4 mm.
V.	7 days.	1.75 "	1. "
XXVI.	Healed.	1.7 "	.7 "
IV.	6 days.	1.7 "	Prolapsed.
XI.	14 days.	1.65 "	.7 mm.
VI.	7 days.	1.57 "	.35 "
XXIV.	Healed.	1.54 "	Nil—torn out.
Average ..		1.92 mm.	1.06 mm.
GRAEFKE'S INCISION.—			
XXVIII.	4 years.	1.8 mm.	1. mm.
XXIX.	Healed.	1.4 "	.5 "
XX.	9 days.	1.26 "	Prolapsed.
XII.	15 days.	1.24 "	.91 mm.
XIV.	20 days.	1. "	.56 "
XIX.	A month.	.94 "	.77 "
XXI.	No history.	.9 "	.45 "
XXIII.	Healed.	.9 "	1. "
VII.	8 days.	.8 "	.94 "
XVI.	28 days.	.78 "	.5 "
XV.	22 days.	.74 "	Prolapsed.
VIII.	11 days.	.64 "	Prolapsed.
XXX.	No history.	.36 "	Prolapsed.
Average ...		.96 mm.	.74 mm.

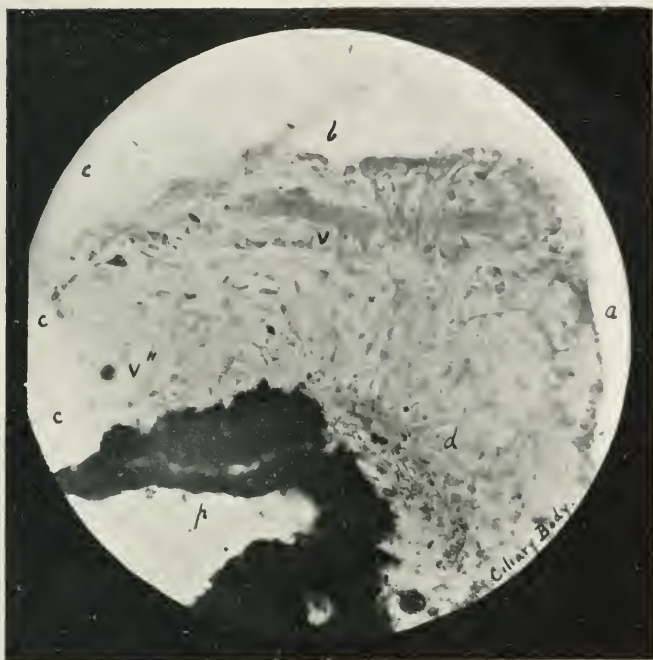


Fig. I.—Iris Stump $\times 210$, 7 days after Extraction.

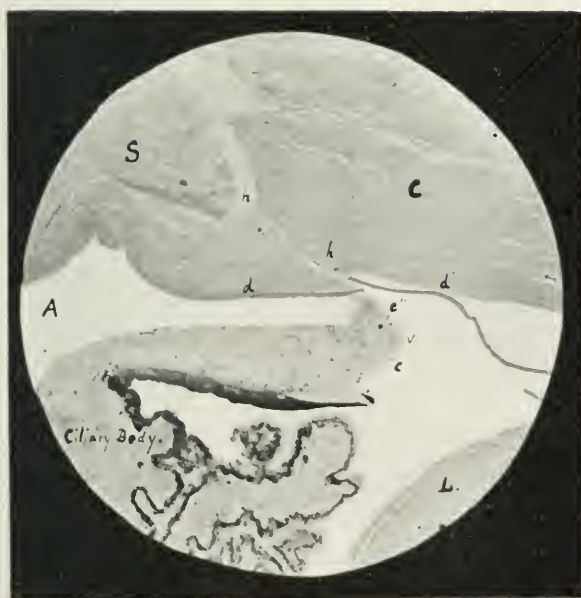


Fig. II.—Iris Stump 15 days after Extraction.

SIMPLE EXTRACTION.—

XXXI.	2 years.	2.65 mm.
X.	13 days.	2. "
XIII.	16 days.	1.5 "
XVII.	27 days.	1.5 "
Average ...		1.91 mm.

TABLE II.

Cases showing Extravasation of Blood adjoining the Sphincter Iridis.

Case	I.	3 days after Extraction, with Iridectomy.
	III.	3 " " "
	VI.	6 " " "
	V.	7 " " "
	VII.	8 " " "
	XII.	15 " " "
	XVI.	28 " " "

TABLE III.

Cases showing detachment of Ciliary Body and Choroid by Albuminous Fluid.

Case	I.	3 days after Operation.
	III.	3 " " "
	V.	7 " " "
	VI.	7 " " "
	IX.	13 " " "
	XII.	15 " " "
	XVII.	27 " " Simple Extraction
	XXI.	P.M. case. There was blood in the Anterior Chamber.

DESCRIPTION OF PLATES.

FIG. I.—IRIS STUMP $\times 210$. 7 DAYS AFTER EXTRACTION.

The length of Iris Stump is unusually small, only .35 mm.
a, Angle of Anterior Chamber; *b*, Anterior Iris Surface;
c,c,c, Cut Surface of Iris forming the base of the Coloboma;
p, Posterior Pigment Layers; *v*, Vessel in longitudinal, and
v', in transverse section; *d*, Origin of Dilator Pupillæ fibres.

FIG. II.—IRIS STUMP 15 DAYS AFTER EXTRACTION.

The cut surface of Iris (*c*) is cut obliquely so that the Anterior aspect is longer than the Posterior. At *c''* there is an extravasation of blood. *v*, Vessel cut transversely; *S*, Scleral, and *C*, Corneal surfaces of incision, *h*; *A*, Angle of the Anterior Chamber; *L*, Lens Capsule enclosing cataractous debris.

FIG. III.—IRIDECTOMY STUMP AFTER GRAEFE'S EXTRACTION.

The Incision (*i*) has healed with the interposition of a large intercalary mass between the Corneal (*C*) and the Scleral (*S*) margins of wound.

The Iris Stump is denuded altogether of the Posterior Pigment Layers (*p*), and shows numerous rents and lacerations (*r*).

The cut surface (*c*) shows no cicatrisation; at (*f*) there is an attachment of Iris to Descemet's Membrane (*d*).

The remnant of the Anterior Lens Capsule (*a.l.c.*) is adherent to the Iris Stump.

FIG. IV.—IRIDECTOMY STUMP 4 YEARS AFTER GRAEFE'S EXTRACTION.

The line of the incision runs through *i, i*; at *d* the several ends of Descemet's Membrane are united by a new formation of homogeneous membrane.

The Iris Stump has its cut surface (*c*) severed obliquely, and it shows no signs of cicatrisation whatever.

On the posterior aspect there is a rent (*r*) of the Dilator and Posterior Pigment Layers.

The Pigment Layers (*p, p*) hang as a long tag down into the Anterior Chamber.

FIG. V.—PUPILLARY MARGIN OF INFERIOR HALF OF IRIS RING
7 DAYS AFTER EXTRACTION WITH IRIDECTOMY.

Sphincter Pupillæ (S.P.) drawn out of its bed and leaving a gap at *a*; there are minute extravasations at *h*; no signs of reaction on the part of the Iris Stroma.

FIG. VI.—EXTENSIVE SEROUS DETACHMENT OF THE CHOROID
28 DAYS AFTER SIMPLE EXTRACTION.

Between the Sclera and Choroid lies space filled with albuminous fluid, *E'', E*; Ciliary Body lies towards *E''*.

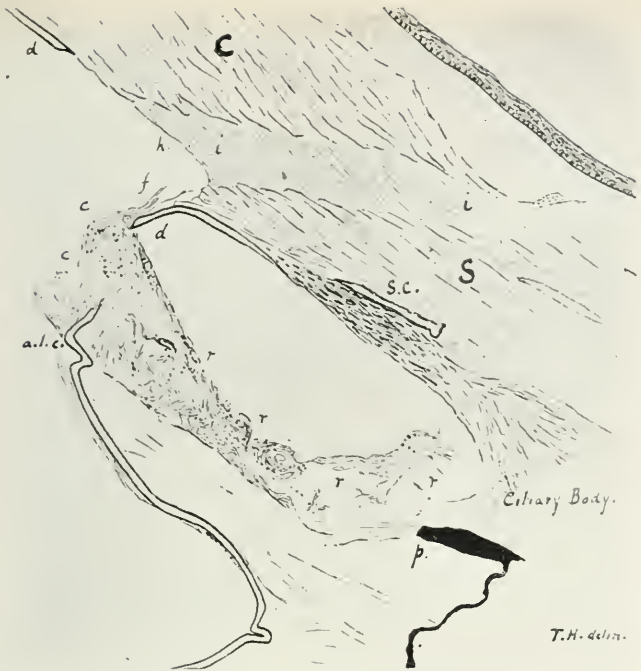


Fig. III.—Iris Stump after Graefe's Extraction.



Fig. IV.—Iris Stump 4 years after Graefe's Extraction.



Fig. V.—Pupillary Margin of Inferior Half of Iris Ring 7 days after Extraction with Iridectomy.

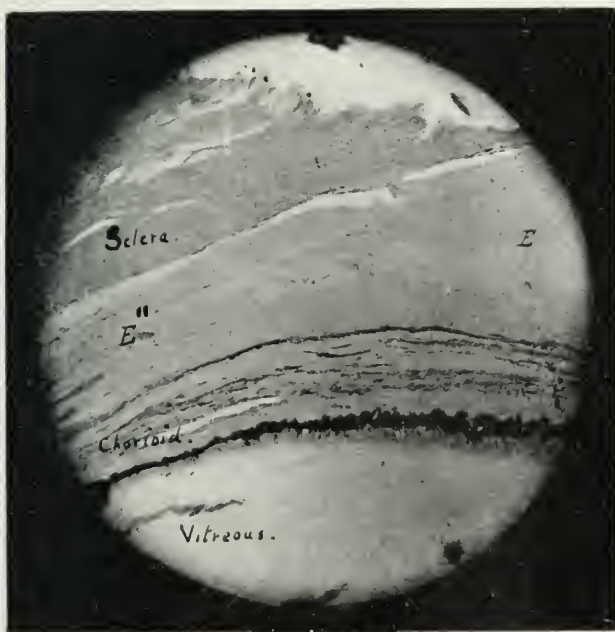


Fig. VI.—Extensive Serous Detachment of the Choroid 28 days after Simple Extraction.

REVIEWS.

G. PAŠETTI and C. SALANI (Florence). **Ophthalmoplegia Externa in Several Members of a Family.** *Annali di Ottalmologia*, April, 1907.

THE special interest of this group of cases is the occurrence of the disease in several members of a family through three generations, in varying degrees, the same type, however, being maintained throughout.

Francesco B., aged 72, a cooper to trade, is the first of the family. His mother died in childbed; his father died at an advanced age, and is stated to have suffered in exactly the same way as the patient himself. So far as is known, the parents of his father and of his mother respectively had no affection of the eyes. Patient is one of a family of twelve, of whom himself and three sisters are alive; the others died young, some of undoubted tuberculosis. His wife was a healthy woman, who bore him seven children; there were no miscarriages. Of these children three died young, and one (a son) aged 25. The remaining three are alive, and, as we shall see, affected with nuclear external ophthalmoplegia. In the patient's own history there is little to note except regarding the actual existing malady. At about the age of 45 he first noticed a slight degree of bilateral ptosis, which has very gradually and persistently increased, and for the last four years or more it has interfered so much with vision that he has worn a little apparatus of his own devising by means of which the upper lids are kept sufficiently raised to allow him to see. In general matters he is a healthy and well-developed man, strong for his years, showing no lesion of breathing, circulation, or digestion. Ptosis is complete and all ocular movements very greatly restricted indeed, but the pupil reactions are quite good. The fundus is quite healthy.

Ester B., his sister, is 66 years of age; she was married at 20, and has been pregnant nine times (twins twice). Of the children seven are alive and well, the others died in infancy. She could give no definite history of the onset of her malady, but has been in the same state for three years at any rate. Vision is good and the fundus healthy, but ptosis is present on both sides, and the ocular movements are deficient in all directions. There is practically complete ptosis on both sides, so complete that the patient has to use the fingers to lift the

upper eyelids, or to tip the head far backwards, when out of doors. The pupillary reactions are not interfered with.

Luisa B., another sister, is now 61; she was married at 16, and had six children, with no miscarriages. Three of the family died of childish diseases. For the last fifteen years she has noticed the lids tending to hang lower. She is in good health, the only fault being a feeling of weight and heaviness in eyelids and forehead. As is the case with Ester B., patient must either hold the head far back or raise the eyelids with the finger in order to walk in the open. The pupils react quite well. The ocular movements are all restricted.

Annunziata B., another sister, aged 52; has had one living child (died in infancy) and several miscarriages. Gives a history of diphtheritic paralysis in childhood. She could not tell exactly at what age the "family ailment" came on first. A moderate degree of ptosis is present in her case, the pupillary reactions are good, and the ocular movements less interfered with than in the previous cases. She has a considerable degree of glycosuria.

Attilio B. is the son of Francesco; he is 43 years of age, a cooper to trade. For the last eight years he has noticed ptosis coming on, but is not at all bad yet. Pupils and accommodation are good, and the ocular movements but little interfered with. A large powerful man.

Olinto B., son of Francesco, and brother of Attilio, is aged 31. Also a powerful man; he drinks a good deal, but does not smoke. Ptosis has been coming on for two years. The pupillary reaction and accommodation are good, and the ocular movements are nearly normal.

Theresa B., a sister of Attilio and Olinto B.; Giuseppe, a brother of Francesco; and Adolfo, a son of Ester, though not examined, are known to be affected also.

There is no room for doubt that in all these cases the lesion is a nuclear one, and not either central or muscular. Closer examination than we have indicated in this brief review convinced our two authors that the affection began to show itself first in levator, then in superior rectus, next in internus and inferior oblique, lastly in the superior oblique and inferior rectus. The only theory which they can bring forward to account for the strange family condition is that of Oppenheim, of a congenital deficiency of the motor apparatus of the eye, by which the activity of the neuro-muscular apparatus wears out after a certain lapse of time, and is not restored.

W. G. S.

SPECIALE-CIRINCIONE (Palermo). **On Splinters of Stone in the Iris.** *Zeitschrift für Augenheilkunde*, February, 1907.

THE lodgement of a foreign body in the iris is a very rare accident. Out of 165 cases of foreign body in the globe in only two was it found in this position, and in each case it was a fragment of stone. In a third case a similar fragment of stone lay at the bottom of the anterior chamber. In each case the foreign body was successfully extracted without impairment of vision resulting, although in the two cases where it lay in the iris iritis with hypopion had been present. Other cases have been recorded where a fragment of stone has remained in the iris for many years without causing any symptoms, and others again where it has been the occasion of an intermittent iritis. The cause of these differences may conceivably lie in one of three directions—physical differences in the nature of the stone itself, the presence or absence of pathogenic micro-organisms and the predisposition of the iris itself to become inflamed. To determine the point three series of experiments on rabbits were undertaken by the author; in each experiment a fragment of stone was introduced through the cornea and pushed into the meshes of the iris. In the first series the stones used were those extracted from the eyes of his own patients. In the second series fragments of different sorts of stone—marble, sandstone, limestone, claystone, etc.—newly splintered so as to imitate as far as possible the ordinary conditions under which these accidents occur, were used. In the third series similar fragments were used, but they were rendered septic by immersion in a culture of staphylococci. In the first series (two eyes) a mild iritis occurred, leaving the eye quite normal. In the second series (eight eyes) nothing happened; the fragments remained perfectly harmless where they were placed. In the third series (four eyes) severe inflammation spread from the corneal wound, leading to prolapse of the iris or adherent leucoma. The conclusion drawn is that the physical character of the stone has very little to do with its power of injury. The presence of septic organisms has much to do with it, but in these cases the cornea becomes infected with a spreading ulcer. In those cases when a minute corneal scar shows the corneal wound to have healed at once, septic organisms are hardly likely to be the cause of a hypopion. Moreover this was negatived in the author's cases by the rapid subsidence of the hypopion after extraction of the foreign

body. The most probable explanation is that in a perfectly healthy subject (as in the rabbit) the tendency to inflammatory reaction caused by an aseptic foreign body lying in the iris may be quite insignificant. But just as the iris is peculiarly liable to be affected by a syphilitic, tuberculous or gouty condition of the fluid in which it lies, so under these or any other unhealthy conditions of the blood or lymph, it is incapable of withstanding the inflammatory reaction caused by a foreign body. Consequently the early extraction of such when possible is strongly indicated, for even when it is apparently innocuous it may not always remain so.

A. H. T.

VAN DER HOEVE (Breda). **Coloboma of the Optic Disc with Normal Acuteness of Vision.** *Archiv für Augenheilkunde*, February, 1907.

A YOUNG man of 19 came up for medical examination for military service. His left eye had a congenital coloboma of iris and choroid with internal strabismus, and was amblyopic. The right eye was normal externally and saw $\frac{5}{4}$, so that nothing abnormal was to be expected from ophthalmoscopic examination. In place, however, of an ordinary disc was a white area nine times the usual size of a disc, partially surrounded by pigment and enclosed, except below, by a ring of atrophied choroid. The retina was emmetropic, but the white area showed myopia of 2D, and inside it were three separate pits each excavated to a depth of 7D. The retinal vessels bent down sharply, some of them at the margin of the white area, others at the margin of one of the pits. The tension was normal, as was the peripheral field for white. There was of course an enlarged blind spot, but with that exception the only indication of interference with retinal function was a defective colour sensation in the upper part of the field, central colour vision being normal. Both right and left corneæ were small— 10×9 mm. and 10×10 mm. respectively—compared with the normal measurements, $11\frac{1}{2} \times 11$ mm. The mother of the young man had a double congenital coloboma of the iris in the left eye. Whether the choroid was also affected in this case was not ascertained. The father, three sisters and a brother had apparently normal eyes.

The association of such a condition as was found in this eye with normal visual acuity is exceedingly rare. Its possibility would become a point of practical importance in case of an

injury of such an eye leading to a claim for compensation. The hereditary element in the case is also an interesting point. A further point not touched on by the author presents itself, viz., the prognosis of his case from the point of view of glaucoma. The small cornea, combined with the sharp bending of the vessels at the margin of the excavated area, and the defect already existing in the field for colour would all point to the danger of true glaucoma developing later in life.

A. H. T.

ROURE (Valence). **The Evil of too Stringent Immobilisation of Cataract Patients.** *Annales d'Oculistique*, March, 1907.

THERE is risk of harm, according to Roure, from too great severity in one's rules as to the behaviour of patients after the operation for cataract. What led him first to this opinion was noticing how some patients a couple of days or so after the operation get out of sorts, with a dirty tongue, foul breath, bad appetite, etc., although the temperature remains normal and there is no serious ailment; at the same time the conjunctiva is a little injected and the pupil tends to be small. It is not simply constipation which is responsible for the mischief, for the patients have always a purge the day before the operation and "intestinal irrigation" 48 hours after it, and besides are fed on vegetables, soups, eggs, milk and such simple foods. Roure found that if he allowed the patients to get up whenever this occurred they improved at once; it should be mentioned that he saw these cases almost solely at a time when his custom was to cause his patients to keep their beds for six days. He has almost eliminated them by reducing the time now to two days, and considers that the whole trouble is caused by an auto-intoxication produced by want of active movement of the body. He remarks that patients frequently imagine that the greatest stillness of the head, legs and even hands is required, and that it is those who carry out this pre-conceived and self-imposed rule most strictly who are most liable to this form of "upset," as one would expect. He calls to mind how, as is now well recognised, too strict immobility is not good for rheumatic persons, who are apt to become worse the less they use their joints, perhaps just because of the toxins generated; and, further, how in hibernation the liver almost ceases to produce or to contain glycogen, that the antitoxic action of the liver is

greatest when it contains most glycogen, and that it is during or after hibernation that the means of defence against toxins are at their lowest ebb. In the case of cataract patients he suggests, further, that when such a one is most strictly at rest toxins are not got rid of by the skin, for there is no sweat secretion, and this difficulty may be emphasised by the copious use of atropin. One cannot help thinking that here the author is driving his theory, good in itself, a little too hard, for no surgeon surely uses atropin to such an extent as to produce its general physiological action. His meaning is that he questions the wisdom of the plan of strict immobility for several (five or six) days after operation, and the reviewer entirely agrees with him. But neither does the author exactly approve of the action of those who go so far in the other direction, as Murell, for example, who operates for cataract in his own consulting room and makes the patient walk home with a bandage on. Short of this, however, some surgeons allow and even encourage their patients to walk about the room or ward a day or even less after operation, and apparently with no ill effect. In this connection Roure uses a argument which is quite fair in the reviewer's opinion, who indeed has employed it in discussing the subject. One meets now and again with a patient who is very restless after operation, sometimes an alcoholic, sometimes a patient of very unstable mental condition; and how rarely does such a one come to any harm! To give a good example, the reviewer not long ago operated on an old lady of 78, long a complete invalid from ununited fracture of the femur. The same night she became maniacal (though she had had no atropin and had no bandage on, but only a protective wire shield). For three weeks she was incessantly restless, shouting, struggling, with difficulty kept in bed, sometimes requiring to be tied down, sometimes kept quiet by means of large doses of bromide and other hypnotics, and yet (or should one rather say, therefore?) her eye healed up perfectly without prolapse, without hæmorrhage, without a trace of iritis or any trouble whatever. Indeed it is one's "well-behaved" patients who come to grief and one's unruly ones who do best. The reviewer is at one with Roure in believing that too restrictive regulations are harmful, depressing and liable to give rise to trouble rather than to keep it away.

W. G. S.

Royal London Ophthalmic Hospital Reports. Vol. xvii., Pt. 1.
London: J. and A. Churchill.

IN this issue of the *Royal London Ophthalmic Hospital Reports* there are several papers of interest. The first of these is a long one by Nettleship on the "Question of Heredity in Retinitis Pigmentosa and Allied Diseases." This is profusely illustrated with family charts showing in a great number of families the incidence of the disease among the various members and branches. The modern teaching in regard to heredity is that consanguinity is but an expression of heredity acting through both parents, and that if husband and wife are entirely free from a certain taint (say tendency to retinitis pigmentosa) they are no more likely to have children affected with this disease than if they were not akin by blood. That may be true; it is a proposition which can only be accepted with caution, since we are ignorant of much in the family histories of nearly all our patients, and there may be important facts in previous generations of which all living representatives are unaware. It is essential, if we are in any instance to exclude atavism and to prove that consanguinity, and consanguinity alone, is the cause of retinitis pigmentosa in certain instances (as has been maintained), we should possess *complete* family histories, omitting nothing. Perusal of the genealogies given will show, however, that in a number of instances, *so far as is known*, consanguinity was the actual cause of the origin of the disease in a family. In this connection one is reminded of the story of the surgeon who enquired of the mother of a patient affected with retinitis pigmentosa whether she and the father were cousins, and was told "No." He noted down accordingly, "Parents not related;" but after the interview was over the father said to him, "The mother and I are not cousins, but we are uncle and niece!" Mr. Nettleship's assiduity in collecting and verifying the family trees of his patients has been extraordinary; in one case he traced seven generations back to a common ancestor.

In a subsequent paper Lawford gives several instances of a family proclivity to primary glaucoma.

Coats's paper on the "Pathology of Macular 'Holes'" is also a valuable contribution. He attributes this curious ophthalmoscopic appearance not to rupture at the time of injury but to œdema of the retina with the formation of cystic spaces in the internuclear layer; the fluid of the œdema may subse-

quently become absorbed. Similar appearances may apparently arise without any injury, but from iridocyclitis, albuminuric retinitis, etc. The defect in the retina at the "hole" may not be complete, but is certainly at least partial.

Hancock writes on the subject of "Head Nodding and Nystagmus," but does not greatly advance our knowledge of the subject. A paper on the "Treatment of Acute Ophthalmia in the East," by Butler, concludes a capital issue of the *Reports*.

LOUIS DOR. **The Chemical Pathology of Cataract.** *Annales d'Oculistique*, April, 1907.

THIS paper commences by the statement that in cataract there is a hydration of the lens and not a dehydration as has been so long believed. The recent notable work of Moerner has shown the presence in large quantity in the lens of a body somewhat resembling a globulin, but having special reactions of its own, which he calls the albuminoid of the lens. Of this substance the cortex of the dried lens contains 21 per cent., the nucleus as much as 64 per cent. It is insoluble in water and saline solution, soluble in mineral acids and caustic potash and precipitated by sodium chloride. It coagulates at about 45° Centigrade. On burning it gives off the odour of sulphur. It does not become opaque, but blackens, like the skin and nails, on mummification, and it is to its presence that the characteristic colour of black cataract is due.

There are also present two soluble bodies which are neither globulins nor albumins; they are precipitated by magnesium sulphate, as globulins are, and on saturation with sodium chloride they remain in solution, like vitellin, but that which particularly distinguishes them is that distilled water does not cause precipitation.

Transparent lenses become dehydrated as they grow older; on the other hand, they contain a greater quantity of calcareous salts, for it is a general law that as organs become older they lose in sodium and gain in calcium.

Deutschmann's table shows the dehydration of the lens:—

Age.	Per cent. of Water.
3	70
35	71
42	68
63	64·6

As a lens becomes cataractous its percentage of water increases, and this increase is chiefly confined to the cortex. The index of refraction alters when cataractous changes begin to appear; Zehender and Mathiesen have shown that in soft cataracts a slight lowering of the index takes place, whereas in senile cataract there is an increase in the index and a tendency to myopia in consequence. There are two ways of explaining the fact that cataractous lenses contain a greater percentage of water—(1) the albumin is less in cataractous lenses and no doubt is replaced by water; 2) there are more salts present, and these will set up an osmotic action.

Salfner has recently studied naphthaline cataract, and finds that there is an increase in bulk and weight of the lens and a diminution in density, and this he shows to be entirely due to a process of hydration.

In 1857 Kunde noted that after administration of 10 to 20 grammes of sodium chloride to young cats a posterior polar opacity of the lens developed. The general opinion on these experimental cataracts is that the opacity is caused by a dehydration, but, as Graefe remarks, it does not follow from this that true cataract is due to a similar cause.

De Wecker in the 2nd edition of his "*Maladies des Yeux*" speaks of "loss of transparency in the lens, the principal cause of which is a diminution in the percentage of water normally contained in the crystalline lens." This theory, which is quite erroneous, rests on the fact that it is possible to cause opacity of the lens by means of dehydrating agents.

It is possible that in the formation of senile cataract there may be present a substance of the nature of a ferment, as suggested by Salfner and Roemer. Its presence is not necessary in the cataract following glaucoma, as proved by Van Geuns, who produced glaucoma and cataract in animals by tying the *venæ vorticosæ*, the cataract consisting of vacuoles and swollen lens fibres about the posterior pole.

Dor's paper, although it contains no original work on the chemical pathology of cataract, is valuable as a critical review of previous work on the subject.

E. W. BREWERTON.

In connexion with the forthcoming International Congress on School Hygiene there is a section for the Medical and Hygienic Inspection of Schools. There is no doubt that in this section the important question

of the inspection of the eyesight of the children will come up for discussion, and papers will be read dealing with this subject. We note also that in the Exhibition arranged in connexion with the Congress ophthalmic appliances are included in the classification. The delegates to the Congress will expect to see some of the latest improvements in these appliances, and we hope that the English opticians will be well represented.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Meeting held at Edinburgh, May 25th, 1907.

The President, Mr. PRIESTLEY SMITH, in the chair.

CARD CASES AND SPECIMENS.

*A case of Lenticonus Posterior (right eye).—*Dr. George Mackay and Dr. W. B. Mackay.

The patient was a girl, aged 8. The right eye presented no appreciable corneal astigmatism by ophthalmometer. Fundus normal. Lens practically transparent, but on minute inspection exhibiting towards the periphery some extremely fine striation. Shadow test revealed marked myopic movement slightly to the nasal side of the centre of the pupillary area, surrounded by a dark shadow ring of denser shade and less mobility than that which is usually seen around a corneal conus. With a stenopæic aperture of about 4 mm. in diameter the myopia appeared to measure about 15 dioptries at the summit of the cone. Subjectively she preferred—10 D sph. but vision could not be improved to more than counting fingers at 2 metres. No appearance of a hyaloid artery, nor of opacity in the vitreous. The outer part of the lens appeared to have approximately normal refraction. Left eye, vision $\bar{c} + 1$ D sph. = $\frac{6}{8}$, partly and J1. There is little to be gleaned from the family history. Parents seem to have good vision and do not use glasses. Paternal grandfather has cataract and other paternal relations are myopic.

*A Peculiar Form of Recurrent Conjunctival Nodule.—*Dr. George Mackay.

Miss A. O., aged 29. Seen first March, 1906. At age of 17, after measles, developed a symmetrical swelling at outer side of each globe near corneal limbus. Dr. Maddox excised each of these. After that the

nodules were no longer evident, but a grey crescent gradually formed at the corresponding part of the neighbouring cornea like a small segment of an arcus senilis. In March, 1905, swelling recurred at inner side of left eye. In May, 1905, came to Royal Infirmary, Edinburgh, and Dr. J. V. Paterson excised it. Section said to have shown small round-celled infiltration with fine reticulum, no giant cells.

Eyes remained fairly well until winter 1905-6, when recurrence in both eyes and frequent pain made her seek advice again. Weak yellow oxide of mercury and cocain ung. night and morning was ordered. Made good progress all through the summer so that the *right* eye was practically well (except for arcus) by November 27, 1906. *Left* eye only affected at outer side.

March 2nd, 1907. Complains of occasional sharp pain in left eye, which at present shows a smooth, flattened, slightly pinkish swelling at outer side of cornea, rising abruptly above the general level of the conjunctiva. The appearance does not admit of a diagnosis of phlyctenulæ, of spring catarrh, of fibroma or more malignant tumour. Vision unaffected.

Traumatic Arterio-venous Aneurism of Right Orbit, with Pulsating Exophthalmos.—Dr. George Mackay.

J. S., aged 31. In July, 1905, was thrown from a carriage on his head. Unconscious for about 8 hours. On recovering felt great pain in head, especially beneath left parietal bone, and whistling noise in both ears. At first appears to have had large extravasation behind the globe. It pulsed and he was unable to shut the eye. Vision was dim. He had diplopia. The prominence has gradually diminished but sight has not improved. The noise has remained constant. In December, 1905, patient noticed the left eye was getting dim.

Seen first on February 15th, 1906. The right eye was obviously proptosed. Paralysis of sixth nerve. Distinct pulsation of the globe. The veins at the root of the nose and about right eyebrow dilated and thickened. Congestion of the post-conjunctival vessels. He could now close the lids completely. The pupil reacted to light and accommodation. Pulsation in the orbit immediately succeeding the apex beat. Bruit audible over a large area of head and neck, its area of maximum intensity being at the root of the nose and round the right eye. The *left* eye not protruded and its muscular movements normal. No pulsation visible. The pupil acted to light and accommodation. The left fundus showed slight congestion of the veins and there was some cloudiness of both discs.

R.V. = Fingers at $2\frac{1}{2}$ m. L.V. = Fingers at 4m.

Treatment. Iodide of potassium, rest, and local compression.

May 3rd, 1906. Seen as Out-patient. *R.V.* = Fingers at $3\frac{1}{2}$ m. *L.V.* = $\frac{6}{36}$. Right fundus, veins tortuous, disc congested; movements of right eye good except outwards. Continued to improve without operation and returned to his work.

April 17th, 1907. Re-admitted on account of proptosis and distension of external vessels increasing.

May 25th, 1907. Exhibited for suggestions as to surgical treatment. Dr. Mackay also exhibited:—

Hyaloid artery. An elderly man with a persistent exsanguine hyaloid artery extending from the disc to the centre of the posterior capsule of the lens. Fundus otherwise healthy. Media transparent.

Tumour of orbit, probably sarcoma. A woman, A.G., aged 42. When first seen a decided proptosis was the only pathological sign. Under prolonged application of X-rays and subsequently high frequency current for several months, the proptosis receded and appearance became almost normal. After neglect of treatment for about a year patient returned with more pronounced proptosis and nodular swelling to be felt occupying especially the outer part of the orbit. No alteration of the fundus of the eye. External muscular movements and pupillary action well performed. No diplopia. Is again under treatment by high frequency, but Krönlein's operation recommended.

Exostosis of orbit. An infant with left congenital ptosis, paresis of upward movement and slight divergence apparently associated with exostosis at the nasal side of the left orbit.

A test object for illiterates. Discs whose surface was evenly chequered with black and white squares were used as the test object. The distance at which it became evident that the surface was chequered and not a uniform grey gave a measure of the patient's visual acuity. With young children the patient was given two discs similar to the test object, one chequered, the other grey, and was asked to indicate which corresponded to the test.

A loupe for the use of myopes. The loupe as ordinarily used, viz., nearer the object than its focus, gives a *virtual* and *erect* image, but is unsuitable for the uncorrected myopic eye. Held further from the object than its focus it gives a *real*, *inverted* image, and this arrangement is available for myopes. A second, weaker, lens may be placed between the eye and the loupe, giving greater magnification and less spherical aberration. The book must be held upside down in reading.

Case of Congenital Anophthalmos.—Dr. Sym.

The second child of the family, aged 12 weeks, female. The parents not consanguineous. Father a congenital deaf-mute. Mother a deaf-mute since early childhood.

The palpebral apertures are extremely small, and even on separating the lids with a hook no trace of globe can be made out on either side. There is no cyst of the lids. The eye lids, though very small, are correctly formed, and are provided with a fair growth of eye lashes; the orbital ridges are very feebly developed and the eye brows were non-existent, but are now appearing. Tears are secreted freely. In other respects the child seems correctly developed.

Case of Unusual Pigmentation of Sclerotic.—Dr. Sym.

This patient, an elderly woman, presented herself on account of an accidental traumatic rupture of the left eye several days ago. On enquiry she stated that the "white" of this eye had all her life been deeply tinted, that of the right eye not at all. In both eyes she had suffered severely as a child from keratitis.

Nearly the whole visible sclerotic, but chiefly the inner and lower-inner parts, was deeply tinted of a blackish colour. The iris was not specially dark; not darker than that of the other eye. The aspect at first suggests argyria, but the hue is not quite the same, and the palpebral conjunctiva is entirely unaffected.

Chorio-vaginal Veins.—Dr. Sym.

There was visible in the left eye of a boy of 8 a large venous trunk collecting blood from the choroid and entering the sheath of the nerve to the upper outer side of the disc, but not visible on the disc itself. The fundus generally was pale (poor pigmentation of choroid) but there was no myopia and no staphyloma.

Congenital Error in Ocular Movements. Faulty Attachment of Internal Rectus.—Dr. Sym.

The left eye of this girl is in a condition of slight enophthalmos and of (chiefly latent) hyperphoria. She complains of more or less constant diplopia. On asking her to follow an object moving to her right along a horizontal plane, one observes the left eye after a time to cease almost completely to move to the right, but to rise higher and higher.

There is no apparent paralysis of any ocular muscle. It is to be noted that it is when the internal rectus is called upon to act alone that the faulty movement is executed.

Double Enucleation for Glioma 18 months ago.—Dr. Sym.

Enucleation was performed in December, 1905, of the right eye, on account of glioma; within a week it became evident that a similar growth was present in the left eye and was growing rapidly: this was at once enucleated also. At that time the child looked very weak, thin, puny,

and delicate. A year later she was a plump, bright, healthy-looking girl. At this date it is eighteen months since the double enucleation.

A further point of interest is that the eldest child in this family of six was also the subject of glioma.

Preparations of the two eyes of the child were also shown.

Case of Reticular Keratitis.—Dr. J. V. Paterson.

Mrs. B., widow, aged 48, was first seen on 30th April, 1907. She complained of dimness of vision, especially in the left eye; no pain, but occasional sensation of a foreign body in the left eye. History quite unimportant; has enjoyed excellent health. No other member of family available for examination.

Appearances. *L.E.* Irregular, wavy, grey, branching, anastomosing lines, forming an irregular meshwork over the surface of the cornea. Towards the centre of the cornea the lines are somewhat broader and cause a denser opacity, and in this area there is a faint general haze. The epithelium over the lines appears œdematous or stippled. The lines can be traced nearly, but not quite, to the corneal margin. The opacity appears to be placed very superficially. There is no sign of vascularization recent or old. The eye is free from congestion and the fundus normal. $V = \frac{6}{18}$ vix.

R.E. Shows the same appearances, but developed to a much less extent. V with +0.5 cyl. axis horiz. $= \frac{6}{9}$.

Patient with Tuberculosis of Conjunctiva of Left Upper Lid. Treatment by Excision of Diseased Tissue and Grafting.—Dr. J. V. Paterson.

A girl of 16. of a healthy family and showing no other signs of disease. Seen first in December, 1906. Conjunctiva of left upper lid was at that time greatly thickened and showed numerous yellowish nodules, but was not ulcerated. On the lid margin a very small abrasion or ulcer was present. Pre-auricular gland enlarged and tender and some swelling of glands in parotid region. History of close association with a friend suffering from chest disease, so that this small ulcer may have become the seat of inoculation.

Diseased tissue excised down to tarsus and graft applied taken from upper arm. A minute subcutaneous nodule excised at same time.

Structure of diseased tissue removed was typically tuberculous, and the bacillus in small numbers was demonstrated in the sections.

The Sinuous Lid Border: a Sign of Trachoma.—Lieut.-Col. H. Herbert.

Lieut.-Col. H. Herbert showed photographs illustrating the changes in curvature which the border of the upper lid undergoes in cases of trachoma. The most usual effect produced is that the inner portion

arches upwards while the outer half shows a convexity downwards, and it was found that this change was most marked in those cases where corneal complications were present. The reason of this is that the corneal inflammation induces blepharo-spasm, and the action of the orbicularis being more marked in the outer half of the lid than the inner leaves this latter part comparatively free to swell and become convex downwards.

A Collapsible Apparatus for Testing the Field of Vision.—Dr. Arthur Sinclair.

This apparatus consists of a specially constructed disc-shaped screen of over 20 inches radius, which collapses on the umbrella principle, and has, in addition, a perimeter arm, so that it can be employed either for Bjerrum's method or for the more accurate measurement of the visual field in a fixed position.

Glaucoma with Charts.—Dr. Arthur Sinclair.

This was a case in which, with extreme contraction of the visual fields, the central vision was still perfect. The tension was $+\frac{1}{2}$ in both, and the optic discs exhibited well-marked cupping.

A case of Retinitis Punctata Albescens.—Dr. Arthur Sinclair.

This was a case of retinitis showing curd-like deposits, which Dr. Sinclair thought might be related to the disease mentioned above.

- (a) *Tuberculous Tumour affecting both Sixth Nerve Nuclei and causing Paralysis of Conjugate Deviation on both sides.*
- (b) *Tumour of Sylvian Grey Matter involving Third Nerve Nucleus causing Bilateral Paralysis of Vertical Movements.*

Dr. Alexander Bruce.

Dr. Robert Fleming showed microscopical specimens of Optic Neuritis due to intracranial tumour, with special reference to the changes in the neuroglial cells.

Dr. E. Bramwell showed a brain with an occipital abscess from a case in which epileptic fits were preceded by a visual aura, and where hemiachromatopsia developed. He also showed a case of ocular palsy due to congenital absence of cranial nerve nuclei.

Dr. Maitland Ramsay showed an opaque projector for teaching purposes.

PAPERS.

The Pathology of Rupture of Descemet's Membrane.—Mr. George Coats.

After touching on the history of this lesion, which was first described microscopically by Becker in 1875, and again by Haab in 1899, by whom

it may be said to have been first recognized clinically, Mr. Coats described the results of his own observations based on the pathological examination of 13 cases, and exhibited lantern slides to demonstrate the microscopical changes. These splits are most commonly found in cases of buphthalmos, where the eyeball is enlarged generally; they are uncommon in cases of uncomplicated myopia since the enlargement under these circumstances takes place towards the posterior pole only. The ruptures occur most frequently in the periphery of the cornea and are usually placed transversely. In some cases the membrane has only become extremely thin and has not completely given way, but more frequently and typically the free ends of the ruptured membrane are very distinct and separated by a definite interval. Often they are somewhat curled up. The endothelium may or may not give way over the rupture; if it does so it is very actively regenerated, insinuating itself into any place where a gap has been formed, and eventually laying down a new elastic membrane. However perfect the repair may be, the edges of the split are generally visible owing to the heaping up of homogeneous substance at the coiled-up ends. Attempts made to produce rupture of Descemet's membrane experimentally in the eyes of young rabbits did not prove successful, owing to the fact that the globe gave way at the equator before any changes occurred in the corneal substances; but if the membrane was scratched previously to the production of distension then many of the features seen in ruptures of the membrane were produced. Erdman, in 1906, produced experimentally ruptures of Descemet's membrane (amongst other changes) by electrolyzing the aqueous in rabbits.

Observations with Rayleigh's Apparatus for Colour Mixing.—Dr. Edridge-Green.

Dr. Edridge-Green examined 38 people with Rayleigh's apparatus, and gave tables of his results. He showed that there were considerable differences in the way in which people were able to match the colours. This was due not to any physical condition present, but could be readily explained physiologically in accordance with the author's theory of colour vision.

A Histological Demonstration on the Third Nerve Nucleus.—Dr. Alexander Bruce.

Dr. Bruce exhibited with the lantern a series of sections showing the various parts of the third nerve nucleus and its relations.

(a) *Notes on the Comparative Anatomy of the Eye*.—Dr. Leslie Buchanan.

The highest type of eye, as exhibited in all vertebrates and some invertebrates, is so arranged that an image of an external object is formed in the eye and transferred thence to the brain. The ocular apparatus, as it exists in some invertebrates, was described and demonstrated by means of microscopic sections thrown on the screen. The *octopus* has a lens and iris as in man, but the main difference is that the bacillary layer is pointed inwards and not outward. The *clam* has a lens which is not adjustable, and the iris is replaced by a ring of pigment developed in the integument and surrounding the cornea, so that evidently a comparatively imperfect image is formed on the retina. The *spider* possesses no special lens, but the shape of the cornea is bi-convex. In the *caterpillar* the eye is a dermic structure, about $\frac{1}{350}$ inch in diameter; the cornea is formed from the horny layer of the skin and the internal structures are developed from true skin. There is a kidney-shaped lens but no well-developed retina. In the *house fly* and the *bee*, the cornea is multiple, each division measuring $\frac{1}{1000}$ inch in diameter; there are 1,000 such areas and each area is a bi-convex or plano-convex lens. Lying immediately behind each of these little lenses is a structure comparable to a retinal cone, and from this cone passes backwards, through a diaphragm of pigment, a single fibre, all the fibres ultimately uniting to form a nerve. This arrangement probably contributes to great accuracy in the matter of perception of direction. The *snail* has only light perception, possessing only a central lens surrounded by pigmented fibres which serve the purpose of retinal elements, while in the *Australian mole* and the *leech*, we find a lower type still, the eye merely consisting of a few pigmented cells which respond in some way to the stimulus of light.

(b) *Case of Rupture of the Pectinate Ligament*.—Dr. Leslie Buchanan.

In March, 1903, Dr. Buchanan brought before the Society an account of the pathological examination of 5 eyes in which rupture of the pectinate ligament had occurred as a result of injury caused by blunt instruments. Two further cases had recently come under his notice, one of which forms the subject of the present paper. The history of these cases in general convinced him that this injury inevitably leads to loss of the eye.

J. C., aged 59, was struck in the left eye with a broom handle on June 29th, 1906; the pain was severe, there was a wound of the conjunctiva on the nasal side, the cornea was hazy, the pupil was dilated and appeared drawn to the nasal side; the iris was tremulous, the anterior chamber shallow at the nasal side but not on the temporal; the

tension was increased; the fundus was dimly seen through hazy media, but no gross lesion was apparent. In the course of the next few months the media cleared so that the lens could be seen lying free and the retina became visible with a +12, the iris was retracted further to the nasal side and a large ectasia of the sclerotic developed above; the pain was severe and the tension +2; vision was barely perception of light. The other eye became irritable so that in January, 1907, the exciting eye was excised.

Pathologically an ectasia was found on the superior and nasal border of the cornea, and another on the temporal side of the globe near the equator; the optic disc was deeply cupped and the pectinate ligament was ruptured, the ciliary body and iris having slipped backwards for about 1 m.m.

The Present Position of the Spirochæta Pallida in relation to Syphilitic Affections of the Eye.—Mr. Sydney Stephenson.

The history of the discovery of the organism by Schandinn and Hoffman 2 years ago, was reviewed; and after comparing it with other organisms not capable of being cultivated outside the body, Mr. Stephenson emphasized the definite diagnostic importance at the present time of the finding of the spirochæta pallida, the clinical evidence as to specificity being grouped under 3 headings:—(1) The discovery of the spirochæta pallida in the healthy eyes of fœtuses and of infants which have died from congenital syphilis. (2) Its discovery in lesions set up experimentally in the eyes of animals by inoculation of syphilitic material, such as chancres or diseased glands. (3) Its discovery in actual syphilitic invasions of the human eye.

With regard to the evidence under the first heading, the organism has been found in practically every part of the eye by Stock, Peters, Römer, and Han Bab, the latter of whom published a paper on the subject in November, 1906; and the contention that the so-called organism was only an artefact is refuted by the fact that the spirochæta has also been found in the blood.

Secondly, experimental inoculations have been made by various observers into the cornea, iris, and anterior chamber, and in some cases the spirochætes were found, especially if microscopical examinations were made early enough, but not in advanced cases.

With regard to observations under the third heading, very few have been recorded; only four positive cases have been described, viz.: by Kowalewski, zur Nedden, Kruckmann, and by Mr. Stephenson himself. The latter also found them in a case of keratomalacia when he used the Giensa method of staining.

In the discussion which followed, Mr. Coats observed that great caution was necessary before definitely deciding that one had the spirochaetes in any smear preparation.

Treatment of Secondary Capsular Cataract.—Dr. Angus McGillivray.

It was pointed out in this paper that the causes of inflammatory reaction, after the operation of needling, were four in number, viz.:—sepsis, undue wounding of the vitreous, prolapse of the vitreous, and dragging on the peripheral attachment of the membrane. The risk of using Bowman's double needle operation was the risk of septic infection, and there was also fear of prolapse of the vitreous, while the difficulty of placing the opening where the operator wanted it was considerable. The operation he recommends is done with a needle knife having a slightly upturned point. It is entered subconjunctivally at the lower inner periphery of the anterior chamber, and after piercing the membrane at its upper outer margin, is made to divide it by a series of small sawing motions as it is withdrawn. The aqueous is retained during the operation by the cylindrical stem of the knife.

In the subsequent discussion opinions were expressed mostly as to the direction of the rent in the capsule; some (*e.g.*, the President) advocating horizontal division. Col. Herbert and Mr. Doyne emphasized the importance of early needling, while Dr. Sym advised the removal of a piece of anterior capsule at the time of the first operation, by which means he considered that needling would be rendered unnecessary.

A Storage Battery for Ophthalmic Use.—Dr. Angus McGillivray.

This was a portable apparatus which cost £3, and could be used for electrolysis, electro-cautery, electro-magnet, and electric light. If properly attended to and not allowed to run down too far or discharged too rapidly, the battery will last 3 or 4 years, after which time new plates and solution are needed.

A case of Parinaud's Conjunctivitis, with Pathological Report.—Dr. Arthur Sinclair and Dr. Theodore Sherman.

A man, aged 61, painter's labourer, was first seen with conjunctivitis of the left eye in July, 1906. Three weeks later swelling of the pre-auricular gland on the same side occurred, and subsequently the sub-maxillary and cervical glands became enlarged. The formation of nodules in the conjunctiva and suppuration of the swollen glands made Parinaud's conjunctivitis the most probable diagnosis.

The patient, after being under observation four months, disappeared, though not completely recovered.

The pathological changes were found to affect the epithelium and the sub-epithelial tissue. The former was thinned, especially where it covered

large collections of plasma cells, and the cells of the deeper layers were either separated by fluid, atrophied, or showed vacuolation. The sub-epithelial tissue was crowded with plasma cells; they were found in greatest numbers round the blood-vessels, and became larger and more characteristic towards the surface of the membrane. Some of them were degenerating and becoming transformed into hyaline bodies. There were also more lymphocytes than usual found in the blood-vessels. In one part of the section there was some localized necrosis.

Bacteriologically, 2 varieties of staphylococcus albus were separated from the conjunctival erosions, and, as a result of experimental investigations on the rabbit, it was thought that they had some direct influence in the causation of the disease. This led to the adoption of treatment by vaccination. The patient, however, did not remain long enough under treatment for any definite result to be obtained.

A case of Telangiectases of the Retinal Capillaries or Venous Radicles.—
Dr. W. B. Inglis Pollock.

John W., aged 53, stone-mason. Two years ago, while at work, he suddenly became aphasic, and this was followed the next day by an attack of slight hemiplegia with diminution of sight in the right eye. There is no history of syphilis, and the urine is normal, but the patient has aortic disease, and it is therefore probable that the attack was due either to thrombosis or embolism.

R.V. $\frac{6}{60}$, L.V. $\frac{6}{12}$, pupils equal and active and the visual fields full.

Ophthalmoscopic examination of the right eye shows the optic disc normal, arteries sinuous, and the veins slightly turgid but not tortuous; the macula is deeply pigmented. Pathological changes are confined to the first and second temporal branches of the superior vein of the retina. These vessels have their walls thickened and sclerosed in places, and some have been converted into white bands. Several of the radicles entering these veins come from convoluted vessels which are directly continuous with the arteries.

In addition there are four groups of massed convolutions, here termed telangiectases. They look like hæmorrhages but have scarcely changed in the course of six months. Careful inspection shows the presence of small vessels in them, especially at the margins. They lie in the plane of the retina. The changes appear to be the result of thrombosis of the superior temporal vein occurring two years ago.

Frost has depicted similar structures in "The Fundus Oculi," pl. xl., fig. 91, but his case apparently went on to retinitis proliferans.

MALCOLM L. HEPBURN.

A CASE OF RETICULAR OPACITY OF THE CORNEA (GITTRIGE KERATITIS, HAAB).

By J. V. PATERSON, M.A., F.R.C.S. (Edin.).

MRS. B., widow, ætat 48, consulted me on 30th April, 1907, on account of failing vision, especially in the left eye. She had noticed the defect in the left eye for about $2\frac{1}{2}$ years. At that time, owing to domestic troubles, she was overworked and much run down in health. Previously she had enjoyed the best of health and she is quite sure that she never suffered from any eye trouble in childhood or youth. There is nothing in the family history to indicate that any other members of it suffered from the same or a similar eye affection. She has two sisters, but as they live in the country I have not had so far an opportunity of examining their eyes. My patient is well educated and intelligent. Her general health is, at present, quite satisfactory. She has been a widow for twelve years. There were no children of the marriage.

Her chief complaint is the dimness of vision in the left eye. There is no pain, but occasionally the feeling as of a foreign body in the eye. She thinks the sight of the left eye is slowly getting worse.

Appearances. Left Eye. The eye is quite free from injection or other signs of irritation. On the left cornea, most marked towards its centre, a number of irregular, wavy, branching and anastomosing grey lines are visible, forming an irregular meshwork. Towards the centre of the cornea the lines are rather broader and their edges tend to fuse, forming a considerable opacity. This is intensified by the presence of a faint haziness of the

cornea in this region. Under a magnification of 10 to 20 diameters the lines are seen to lie very superficially, apparently just under the epithelium, which is raised over them and shews slight stippling. The general haze is found to consist of very fine grey dots, the position of which is perhaps not quite so superficial as that of the lines. There is no sign of vascularization, recent or old, and the conjunctiva of the lids is quite normal in appearance. The lines can be traced nearly but not quite to the corneal margin. LV= $\frac{6}{24}$; fundus normal.

Right Eye. In this eye only a few irregular wavy lines are visible on the cornea; no trace of haze. The lines are identical in appearance with those seen on the left cornea. RVe + 0.5 cyl. horiz. = $\frac{6}{9}$.

When last seen (June 11th, 1907) the appearances had not appreciably altered.

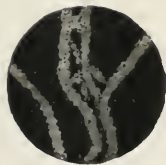
This form of corneal opacity appears to be very rare. The appearances in a typical case are so striking that they could not fail to be recognized, yet Parsons in his well known text-book of pathology only cites one case from an English journal, viz., a case shewn by Treacher Collins at a meeting of the Ophthalmological Society in 1899. Fuchs describes the condition very briefly and apparently considers it closely allied to nodular opacity of the cornea. Some years ago I saw two patients, a brother and sister, under Mr. Berry's care in the Edinburgh Royal Infirmary, in whom the appearances were practically identical with what I have described. Mr. Berry kindly examined my patient and corroborated my opinion that the case was of the same nature as those which he had observed.

The appearances in these cases have little or no resemblance to what one sees in nodular opacity. In the later stages of that disease (and of this many of the

LEFT CORNEA.



RIGHT CORNEA.



Portion of lines
more highly mag-
nified.

(The central opacity is greatly over-
accentuated in the drawing.)

DR. PATERSON'S CASE OF RETICULAR CORNEAL OPACITY.

published cases appear to be examples) opaque nodules appear especially towards the centre of the cornea, and the appearances altogether are less distinctive and less striking than those of the reticular affection. Haab has described and figured a case in a youth of 16 years (*Zeitschrift f. Augenheilk*, 1899, p. 236). From the description and the drawings the case appears to have resembled very closely the one under consideration. Haab found that the patient's mother, his uncle and two aunts, all suffered from the disease, but in a much more advanced stage than the boy. In the mother the centre of the cornea was hazy and roughened from the presence of irregular opacities, and the characteristic lines were only observed over a limited zone. No doubt the lines appear first in the disease and may precede by a long period of years the formation of grosser and more central opacities.

Haab looks on the disease as a degenerative and not an inflammatory process. This, indeed, is evident from the inspection of an early case such as ours. In one of Haab's patients the disease appeared to be non-progressive. As a rule the disease appears to progress slowly and finally to cause very great diminution in the acuteness of vision. In the case before us it is of course possible that the duration of the disease has really been much greater than the patient herself imagines.

Dimmer cites 3 cases (*Zeitschrift f. Augenheilk*, 1899, p. 354) occurring in three members of a family, ages 51, 55 and 57 years. In all these cases the disease seems to have been in an advanced stage. The drawing given does not correspond with what we have observed in typical cases. In all Dimmer's cases there was a history of eye inflammation in youth and the vision had been defective for from 20 to 30 years.

Freund (*Archiv. fur Ophth.*, lxii., p. 377) cites no fewer than 15 cases, all from two families. Drawings illustrative of some of the cases are given. In most of them two systems of branching lines are shewn, (a) a coarser meshwork corresponding to what is figured in our case, and (b) a close network of exceedingly fine lines. Fairly large spots of opacity are also shewn in the drawings, mostly placed towards the centre of the cornea. The right eye in our patient's case appears to me to illustrate the disease at a very early stage and is to be compared with fig. 13 in Freund's article.

Nothing is really known of the pathology of this disease, which in many respects presents very peculiar features. Its occurrence in several members of the same family is very notable.

REVIEWS.

A. BIRCH-HIRSCHFELD (Leipzig). **Eye Symptoms in Disease of the Accessory Sinuses of the Nose.** *v. Graefe's Archiv für Ophthalmologie*, 65, 3.

THIS paper, written by one who has contributed not a little to our knowledge of certain disorders of the eye, is of more than common interest. The subject is one which lies on the borderland of two special subjects, an intimate knowledge of both of which is not usually enjoyed by one person. In cases of this kind, the more obvious disease being usually nasal, the patients generally present themselves before a rhinologist, and the opportunity to investigate their eye symptoms does not always present itself.

After a rapid review of the more recent literature of chief importance bearing on this subject the author states that in his paper he means to restrict himself to the consideration of the affections of the optic nerve induced by disease or tumour of the neighbouring sinuses, and to leave on one side—meantime at any rate—such other lesions as irido-choroiditis arising from

such a cause. Specially he desires to make out whether one can obtain any satisfactory clinical indications of disease of the sinus by examination of the eye: can we by clinical investigation of eye symptoms obtain assistance in making a diagnosis and in devising treatment which may lead to the conservation of the vision or the life of the patient affected? By thus restricting the scope of his paper and by giving it a mainly practical and clinical aspect he really increases its value.

It is quite possible that lesions of the optic nerve are more frequent from this cause than one is apt to suppose, for except for eye symptoms it would often be well-nigh impossible to diagnose the existence of a lesion of the sinuses of the ethmoid or the sphenoid, and every ophthalmic surgeon will admit that in a certain number of cases of affection of the eyes there is the greatest difficulty in discovering any "cause" at all. The optic nerve may be attacked on one side or on both, and as a rule the onset of symptoms is very rapid if not abrupt. In a doubtful case a scotoma should be sought for very carefully, for in Birch-Hirschfeld's experience this is a more frequent and more important indication than its position in literature would lead one to suppose. As in other cases of retro-ocular neuritis so in this condition there is no relation between the defect of vision and the ophthalmoscopic appearances; the disc and fundus may appear hardly different from normal, although vision is very gravely reduced. In any records of such cases it is eminently desirable that accurate records of the size and depth of the central scotoma (if such exists) and of the extent of the fields, should be obtained; this has not in the past been attended to with sufficient care.

The author next discusses several recorded cases bearing on the subject, including a curious one by Nuel. In this case Nuel diagnosed carcinoma of the orbit and a chronic amblyopia from tobacco and alcohol, and after enucleation confirmed the "toxic" diagnosis by means of the microscope. But both the author and Siegrist cast some doubt upon Nuel's conclusions,—partly because in Birch-Hirschfeld's fourth case, of which we shall give abbreviated notes, exactly similar conditions were present, but no tobacco was used.

The author's first case of the four was that of a woman of 35, in good health. She had complained for a fortnight of defective vision in her left eye, the right being of little use on account of high and uncorrected myopia. She had no swelling in the upper jaw, but the second left upper bicuspid tooth was tender

and carious. She was found to have a small central scotoma for red and green, but a good field otherwise. Pus was found to be present in the antrum, from which it was let out, but a week later the central scotoma was larger and had become absolute, and there was a low degree of exophthalmos with slight limitation of movement laterally. The fundus showed no changes. A week later the scotoma was again a little larger and there was a distinct peripheral restriction. An extensive operation was then performed by the rhinologists, and the ethmoidal and sphenoidal sinuses and the antrum explored and drained; very little pus was obtained from them, however, and no improvement in the patient's condition resulted, except that the exophthalmos was lessened, and optic atrophy then came on. In this case it was probable that an inflammatory attack had spread from the antrum to the other bony sinuses and to the apex of the orbit (causing the muscular paresis), but did not go on to abscess formation in the orbit. Had the surgeon not restricted the first operation to the upper jaw, but proceeded to open up the other bony cells, the eventual result might in Birch-Hirschfeld's opinion have been more satisfactory. The second operation, three weeks after the first, was too late to be of much service in this connection.

The second case was that of a young man of 19, who had always had good sight (he wore correcting lenses for his myopia), but for about six months had complained of frontal headache and had occasionally had a disagreeable taste in the mouth, as of pus. He was rather liable to "colds in the head," and it had seemed to him that his headache was worse when the nose was blocked. For a few months vision had been reduced, and this was rendered worse after each access of headache. In the right eye he had an absolute central scotoma, and in the left a relative one for red and green. Each disc was decidedly pale over the temporal half. Vision was reduced (with correction) to finger-counting at 1 m. with the right eye and $\frac{6}{100}$ with the left. There was no indication pointing to insular sclerosis. Although the evidence was but slender, the author considered that the origin of the scotomata was an inflammatory affection of the sinuses, and induced a surgeon to open up the sphenoidal cells *via* the nose. No pus was obtained, but there was polypoid overgrowth of the mucous membrane, which was scraped away. The vision and scotoma of the left eye remained as before, but the sight of the right rose to $\frac{6}{24}$ and remained so, and the scotoma was no longer absolute. The

case is valuable as showing that even after the scotoma had been absolute for a month operative treatment was capable of bringing about a great improvement (in one eye). Had it been instituted sooner an even greater gain might have resulted.

The third case was that of a woman of 45, who had never had any nasal trouble till two days before she became a patient. She was then attacked by severe nasal catarrh, violent frontal headache and rise of temperature, with proptosis on the right side. The lids were much swollen, and pressing the globe backwards and particularly inwards caused extreme pain. Movements were not restricted, the cornea remained clear, and the pupil reacted. Vision = $\frac{6}{60}$. The disc was hyperæmic and slightly swollen. The patient gave one the impression of being very seriously ill, and unfortunately it was in consequence impossible to map out any scotoma. The diagnosis was one of acute abscess in the orbit, probably taking origin in the sphenoidal cells, and in order that this might be cleared out at once and efficiently resection by Krönlein's method was promptly carried out. A large quantity of greenish pus was obtained on separation of the periosteum of the inner wall of the orbit; the anterior part of the wall seemed normal, but there was a perforation through the lamina papyracea about 2 cm. behind the *crista lacrimalis*. This was freely enlarged and the thickened and polypoid mucous membrane thoroughly scraped. A probe was passed through to the nose and drainage established by that route. The employment of the temporary resection by Krönlein's method was felt to be a great advantage, allowing for more free access and more thorough treatment than could otherwise have been attained. Healing was rapid, and vision rose very shortly to $\frac{6}{24}$, but for a time there remained a relative scotoma for red and green. This, however, cleared up after a little delay and vision returned to normal, the exophthalmos vanishing also.

In this case there can be no doubt that there was an empyema of the sphenoidal cells which made its way into the orbit, affecting also the optic nerve and causing grave defect of vision. Unfortunately the existence of a central scotoma at the height of the disease cannot be absolutely affirmed, for the patient was too ill to be thoroughly examined.

It is noteworthy that in all these three cases it was primarily the defect of sight which drove the patient to seek advice: the preceding invasion of the bony spaces had really caused no

symptoms at all. In the second and third cases active treatment was productive of most beneficial results.

The important question arises: What are the actual anatomical changes in the nerve which lie at the root of this central scotoma in such cases as those above narrated? Since there have been no *post-mortem* examinations one has to fall back upon surmise and analogy. We can to some extent distinguish between mechanical and inflammatory factors, even though in most of the cases both elements are present and of importance. Is direct pressure on the nerve as it passes through the bony canal capable of injuring the papillo-macular bundle, which at that particular part lies in the central part of the nerve? It is of course possible that this bundle has a higher vulnerability than have the other fibres, and the fact of their being specially affected by toxic substances helps to bear this out. Have we to do here then with the result of direct pressure, or with an indirect influence upon the nerve fibres caused by interference with circulation, or with an interstitial neuritis, such as Uhthoff believes to be the real cause of alcohol-tobacco amblyopia? The clinical facts are against this latter theory for one would expect the peripheral fibres to suffer first (in this instance the nasal) before the central, if the inflammation spread from the bony cells at the inner side of the nerve; there would thus be peripheral limitation of the field, which certainly does not occur. A further possibility might be that the toxins liberated by the inflamed area of bone and carried by the blood path acted upon the most susceptible tissues in the neighbourhood, viz., the papillo-macular bundle. Another point of much moment is the fact, observed by Jessop and Siegrist particularly, that a neoplasm growing from the bony spaces has caused a central scotoma. The author's fourth case bears upon this matter.

A woman of 60, in good health previously, had complained of severe pains in the head for three months. At the same time she occasionally had a taste in the mouth as of pus; while for six weeks vision had declined and proptosis had come on. On examination there was a central scotoma; red, blue and green were all called black, and yellow and white were grayish; the colours were recognised excentrically. Vision was equal to finger counting at 2.5 m. Rhinoscopy showed a decided projection of the middle turbinated, and this was in part removed but without pus being obtained. Immediately after this vision grew worse and the exophthalmos increased; iodide and arsenic

proved unsuccessful, and at last the tumour was disclosed by an incision in the internal corner of the right orbit. The growth was closely attached to bone and lay in intimate relation to the ethmoidal cells; it was obviously impossible to operate without loss of the eye. Exenteration of the orbit was accordingly performed when it became plain that the tumour took its rise in the posterior ethmoidal cells, and that it had broken through the orbital wall at the inner side for a distance of about 1 centimetre. Entire removal of the new growth was impossible. The orbit became covered with fresh granulations and there was no local recurrence after several months, but on the other hand the patient in a very few weeks began to complain of failure of sight in the left eye, which had hitherto been normal; there was found to be a small central scotoma for colours. Further operative treatment was considered to be out of the question. In a very short time vision became worse and the scotoma absolute in degree and larger in size; the general condition of the patient also got rapidly worse, and she died very shortly.

Birch-Hirschfeld reports separately on the three portions of tissue removed from the right orbit, the first being the globe and the termination of the optic nerve, the second being the main part of the nerve, and the third that part of it embedded in the tumour. The first part showed choked disc, with the fibres much broken up. The second part, particularly about the point of entrance of the perforating vessels, showed an area of destruction of nerve fibres and of great increase in the glia nuclei; the rest of the nerve showed no great departure from normal, pathological changes being practically limited to the part mentioned—an extent of about 2.5 mm.—as was well shown in the serial sections prepared. It is very interesting to note that in this affected area the point at which the changes are greatest is exactly that of the exit of the perforating vein, at the middle portion of the temporal sector, the part namely in which the papillo-macular fibres run. At this spot the nerve fibres were certainly reduced in numbers and were all more or less abnormal, the glia cells were swollen and so closely packed as to leave little room for the fibres. Into the identification of the numerous epithelial cells with the true glia cells the author enters with much care. He could discover no changes in the vessels of the character of an endo-vasculitis or peri-vasculitis, and there was no thrombosis, but the vein was greatly constricted at the affected part as it passed through the sheath.

This alone, however, is not to be regarded necessarily as a pathological condition: it is seen in normal nerves also; but the vein itself and the small branches present were well filled with normal looking corpuscles, indeed distended with them.

The morbid process then is not so much inflammatory as exudative; it is not an interstitial neuritis, in the opinion of the author; he believes that the first step is the vascular alteration leading to œdema of nerve fibres, which may be toxic in its origin, and that the other changes, those in the nerve fibres, are secondary to this. The author sees here a close analogy with such acute toxic effects as in male-fern poisoning or that by methyl alcohol. This postulated toxic œdema may have been caused directly by the pressure of the new growth on the nerve, or indirectly by pressure transmitted through other tissues.

Examination of the tumour itself showed that it was an undoubted carcinoma, growing from the mucous membrane of the accessory sinuses: it is probable that the choked disc arose from the compression of the vein quite behind its exit from the nerve—behind the apex of the orbit indeed, the two lesions having thus been caused by the pressure of the tumour, viz., the choked disc and the œdema of the nerve. But if that, and that alone, were the cause of the changes why should we not always have a central scotoma in choked disc? Birch-Hirschfeld's answer is that in this case there is in addition a toxic influence. This toxic influence may be analogous to that present in the acute alcohol-tobacco amblyopia, which, according to Sourdille, acts first upon the capillary walls and leads to thickening of them and diminution of their lumen, with consequent degeneration of the nerve fibres, proliferation of neuroglia and interstitial formation of fibrous tissue,—all of which were present in Birch-Hirschfeld's case. Whether this view of the origin of tobacco amblyopia is accepted as correct or not (and it is controverted by some writers), the article at present under review is a very valuable and interesting contribution to our knowledge of the subject.

Birch-Hirschfeld sums up the main points in his paper thus:

1. Inflammatory affections and tumours of the posterior accessory sinuses may attack the optic nerve and orbit, and give rise at an early stage to more or less severe deterioration of sight.

2. This interference may take the form of a central scotoma, the peripheral field remaining intact.

3. Diagnosis of such conditions is often beset by many difficulties, and one may be greatly assisted in the early recognition of a very grave condition by the onset of the symptoms described.

4. In the differential diagnosis, against a toxic and infective neuritis and in favour of a nerve lesion caused by disease in the sinuses important points would be (*a*) the unilateral occurrence of these symptoms (but—as illustrated—this is not altogether to be relied upon), and (*b*) the acute and progressive character of the failure of central vision, the scotoma, at first relative, becoming absolute.

5. The anatomical basis of the scotoma is an isolated affection of the papillo-macular bundle behind the point of entrance of the perforating vessels. It consists in œdema of the nerve, swelling and proliferation of the glia cells, and marked destruction of nerve fibres. Venous stasis at a certain specific area is the probable occasion of its occurrence, aided perhaps by a toxic influence upon the nerve fibres.

W. G. S.

STEIGER. **Corneal Curvature in Relation to Heredity.**
Zeitschrift für Augenheilkunde. Vol. xvi., Parts 3 and 4;
Vol. xvii., Parts 4 and 5.

EVERYONE with any experience of ophthalmic practice must have been struck with the number of cases that occur in which members of the same family have astigmatism very similar in kind and degree. Since the shape of the cornea is the main factor in causing it the determination of corneal astigmatism by means of the ophthalmometer in a large number of children suffering from defective vision and afterwards in one or more of the near relations of each of these children was the task undertaken by the author of these papers, in order first, to determine how great an influence the hereditary factor plays in causing astigmatism, and, secondly, to throw some light on the problems of heredity itself.

A preliminary investigation was undertaken on a small number of school children in Bern, and the results published in 1895. Having collected 31 astigmats of 2 D or more "with the rule," 61 of their relatives were tested for corneal astigmatism. Whereas the normal average of corneal astigmatism is 0.75 D (with the rule) the average in the case of these

61 relations of astigmats was 1.68 D. Further, whereas normally corneal astigmatism of more than 2 D occurs in only 3 per cent. of the population, among the 61 relatives of astigmats it occurred in 24 per cent., and the cases of 0.5 D or less sank from 42.7 per cent. to 0.7 per cent.

The more recent investigation is based on an examination of school children at Zürich (selected on account of having astigmatism prejudicial to vision) together with their near relations in all cases where this was possible. The number of families investigated was 842. In most of them (623) only two individuals, but in some three, four or five, were examined. From this material the author has compiled somewhat elaborate tables comparing the conditions of corneal astigmatism in—(1) pairs of sisters, (2) pairs of brothers, (3) brother and sister, (4) mother and son, (5) mother and daughter, (6) father and son, (7) father and daughter, (8) three children of one family. From these tables the following are the main conclusions:—

1. There are some families where a low degree of astigmatism (1 D or less) tends to show itself, others where a moderate degree (1 D up to 4 D), and others again where a high degree is present in a far greater proportion of individuals than the average.

2. The mother is rather more likely to transmit her astigmatism to a son or daughter than the father. On the other hand, no difference between sons and daughters can be shown to exist in their liability to inherit astigmatism from either parent.

3. Astigmatism "against the rule" is very rare (1.2 per cent.) in children, but during adult life a tendency exists for the vertical meridian of the cornea to become flatter so that in old people (over 70) this form of astigmatism is very common (35 per cent.). Though not usually congenital, there is evidence that the tendency to acquire this form of astigmatism is inherited. Thus 49 children were found to have it, and 82 of their relations were tested. The proportion among the latter was far in excess of the average, whereas the number with high astigmatism with the rule was abnormally small.

4. In the directions of the axes of astigmatism heredity can also be traced. Thus in 25 families investigated not a single case of obliquity of the axes was found. On the other hand, in six families in which nasal obliquity was found (the common form) only 9 out of 36 eyes were *not* affected in this way, while in families affected with the rarer temporal obliquity in five,

two members, and in one, three members, were so affected, a fact hardly to be explained by coincidence.

The last two articles deal in a similar way with the spherical curvature of the cornea from the point of view of heredity. An investigation on lines similar to the former one brings out the hereditary influence very strongly. Thus, having found the average curvature of the cornea (which, by the way, bears no constant relation to the total refraction of the eye) to be from 41 to 44 dioptries, Steiger classifies the cases investigated according as the corneal curvature is under 41 D, between 41 and 44 D, or over 44 D. About 60 per cent. of normal cases belong to the middle group, 20 per cent. to the first and 20 per cent. to the third. Now if children belonging to the first group (flat corneæ) be compared with their brothers, sisters, fathers or mothers, flat corneæ are found in the relations in a far larger proportion than the normal 20 per cent. (allowing for the tendency of the cornea to get flatter with age). Similarly with the group of children with unusually highly curved corneæ and their relations. The correspondence indeed is greater than can be accounted for on the assumption that every child derives his corneal curvature from one parent to the exclusion of the other. In one group of cases, for instance, 26 fathers' eyes with highly curved corneæ were compared with 26 sons' eyes; 14 of them were found also to have highly curved corneæ, and not one an unusually flat one. Again in 28 other cases the fathers' eyes had unusually flat corneæ, and although 15 of the sons' eyes had also unusually flat corneæ not one had an unusually curved one. To explain this the author suggests that even in those cases where the influence of one parent is manifestly predominant, that of the other still plays a part; or else it may be that there is an innate tendency hostile to extreme variations.

However this may be, it is certain that in a large proportion of cases corneal astigmatism is inherited from either the father or the mother. Whether in some cases the meridian of least curvature can be derived from one parent and that of greatest curvature from the other is doubtful. It seems less unlikely than the author's suggestion that the spherical curvature should be derived from one parent and the astigmatism (*i.e.*, the difference between maximum and minimum curvature) from the other.

At any rate these papers with the tables included in them are worthy of careful study by anyone interested in the

Mendelian theory of heredity, and they suggest a field which promises to be fruitful for those who are engaged in working out this very complicated problem.

A. H. T.

A. C. REID. **Miners' Nystagmus.** *Brain*, Part cxv., Nov., 1906.

THE object of this paper is to attempt to reconcile apparently antagonistic views with regard to the etiology of miners' nystagmus. Snell came to the conclusion that it is essentially a myopathy, dependent on the peculiar position assumed by a class of miners, which produces chronic fatigue, and consequent atony, of certain ocular muscles. Also that "with very few exceptions the miners have been those whose work has been done on their side, more or less, in connection with work called 'holing.'" On the other hand, Court's investigations lead him to maintain that position has very little, if anything, to do with its production, and that the insufficient light of the safety lamp is the chief, if not the sole, cause of the affection. This view is also held by Tatham Thompson, who finds that nystagmus is much more common in South Wales among those who work with a safety lamp and where no "holing" is done, than among those who work with a naked light, and therefore good illumination, where "holing" is necessary.

The writer in his article endeavours to prove that fatigue of the muscles is not an essential etiological factor, but that the affection is due to a disturbance of the centres having to do with the equilibration of the eyeball, and styles his theory the "equilibration disturbance theory." He considers that the nystagmus depends less on muscular weakness than on defective central co-ordination.

Reid's observations were made at a pit where the men never lie down to get the coal and where no "holing" is done. In some of his cases all the external muscles of the eye appeared to take part in a rhythmical contraction, which resulted in a "beautiful rotatory movement;" in others the external and internal recti were only or chiefly affected, producing the more common side-to-side movement. He found that, although the nystagmus generally occurred when the patient's gaze was directed upwards it frequently continued, and occasionally was more marked, on looking downward or to one side.

Fixation of the eye is mainly a reflex dependent on the higher visual acuity of the fovea. "With dark adaptation, however, visual acuity is equally good in all parts of the retina, except in the fovea, where it is lowered" (Schäfer). Darkness thus renders fixation difficult, and the movements of the eye tend to escape from control.

The writer maintains that this fact is of great importance in causing a tendency to instability of the globes, and that the function of the centres which maintain their equilibrium is thus disturbed by (1) imperfect fixation due to dim light, and (2) a constant tendency while at work to disturb the equilibrium of the body owing to the various positions the miner has to assume. A disturbance of equilibrium of the body even in daylight is sufficient to make manifest a latent nystagmus; thus if a miner with latent nystagmus is told to turn round quickly several times in succession and then to fix his gaze on an object the nystagmus will at once be brought into evidence, even when other means have failed. This puts no strain on the elevators, but tends to disturb the bodily equilibrium.

In conclusion, the writer considers that the etiology of miners' nystagmus is complex, and that the following factors are important:—

1. Conditions tending to do away with yellow spot fixation, *e.g.*, feeble light.
2. Conditions tending to disturb the equilibrium of the body.
3. Conditions in which a series of rhythmical movements is made by the body, the eyes remaining fixed on an object.
4. Certain debilitating influences such as alcoholism, influenza, accidents, etc.

CHARLES BLAIR.

ROLLET (Lyon). **Extirpation of Orbital Tumours, with Preservation of the Eye, by Cutaneous Curvilinear Incisions.** *Archives d'Ophthalmologie*, May, 1907.

PROFESSOR ROLLET in this paper draws attention to the value of the old-fashioned cutaneous curvilinear incisions, and the advantages of simple orbitotomy over Krönlein's operation and the trans-malar method of dealing with orbital tumours.

He gives details of three cases successfully operated on in this way.

The first case was a suppurating orbital cyst, in a man of

48. The tumour was the size of an almond, situated between the right inferior rectus and the orbital margin, tense, painless, unattached to bone. Rollet made a large horseshoe-shaped incision, concave upwards, over the tumour, believing it to be a new growth. The lower conjunctival *cul-de-sac* was detached unopened. Dissection revealed an abscess cavity containing purulent and mucoid material with staphylococci. The abscess wall was dissected out with the exception of a small portion adherent to the right inferior rectus, which was scraped. The patient made a rapid recovery, and was discharged within eleven days with vision and ocular movements normal.

The second case, a traumatic hæmatocele of the apex of the orbit, occurred in a child aged 3 years. It had originated a month previously after a blow on the temple. The eye was pushed markedly forwards, down and out; there was papillitis, and vision was reduced to fingers at 1 metre. As no swelling could be felt between the orbital margins and the globe, and fearing that interference with the growing bone might lead to subsequent trouble, Rollet hesitated to do Krönlein's operation, but made a large curved incision on the inner side. A careful exploration of the optic nerve region revealed nothing. Healing took place rapidly. Twenty days afterwards the exophthalmos had increased considerably, and the eye was immobile. Urged by the parents, who gave permission if necessary to remove the eye, Rollet now made a large crescentic incision on the outer side with its concavity inwards. Exploration with the finger revealed a large blood cyst. This was extirpated, and recovery was rapid. Five months later vision and movements were normal, and the cicatrices were hardly visible and non-adherent.

The third case was a sarcoma of the optic nerve in a young man, aged 20. There was exophthalmos, papillitis and rapid loss of vision of the affected eye. A large internal orbitotomy was performed, and a growth was found enveloping the optic nerve. This was shelled out with the finger, the optic nerve cut immediately behind the eye, and again as deeply in the orbit as possible. The exophthalmos disappeared rapidly, and the appearance of the fundus changed from a dirty white to a yellowish rose colour. A month after the operation the volume of the eye was preserved, its tension and movements were normal. The pupil was widely dilated and there was anæsthesia of the cornea and conjunctiva.

The results in all three cases were excellent, and serve to

show what may be obtained with simple orbitotomy without having recourse to decidedly more complicated operations.

According to Chaillous, whenever the diagnosis of the nature of an orbital tumour is doubtful we ought never to enucleate without first performing an exploratory operation; this he gives as an indication for Krönlein's operation, but in cases where operative interference has to be undertaken at once, and the indications are relatively simple, as in Case iii., an internal orbitotomy would appear to be the operation of election. An external orbitotomy only allows of a modified exploration of the orbit. Krönlein's operation and the trans-osseous malar operation are infinitely more complex; bony union is slow and the risk of infection great.

Legrange, in his report on Krönlein's operation presented in 1903, says that it has the advantage of giving a relatively large field of view; its disadvantages are that the ciliary nerves and ganglion may be destroyed, and that ptosis, strabismus and immobility of the pupil may follow; it is relatively laborious, and sometimes leaves an unsightly cicatrix. To these objections Rollet adds that osseous sections are easily infected, and that he personally would rather operate at the bottom of the orbit by touch than by sight.

In performing simple orbitotomy the position of the incision is of course dependent on the salience of the tumour; if down or out, the horseshoe incision is made down to the bone over the inferior or external orbital margin, the periosteum detached, and the globe, with the conjunctival sac unopened, held aside in a spoon-shaped retractor. It is not necessary to divide the external rectus. If the incision is to the inner side, the pulley of the superior oblique must be detached by the rugine, and the lacrimal sac drawn down and out.

J. BURDON-COOPER.

DUBOIS and CASTELAIN. A Contribution to the Study of the Motor Innervation of the Iris. *Archives d'Ophthalmologie*, May, 1907.

THE authors in this article take up the question of the supposed influence of the fifth nerve over the movements of the iris, and the results of stimulation of the third nerve, points over which much conflicting evidence has been forthcoming. They experimented on dogs. The cord was divided at the level of

the second cervical vertebra so as to avoid difficulties with the anæsthetic. The supra-orbital was the sensory nerve stimulated. The third nerve was approached through the temporo-orbital region, the zygoma was resected, the temporal muscle detached from the jaw and raised by the cautery so as to avoid serious hæmorrhage, and the skull trephined. By raising the base of the hemisphere the 3rd nerve was exposed from its origin to its entrance into the cavernous sinus. The object of the research was to ascertain whether stimulation of a sensory nerve such as the 5th was capable of producing dilatation of the pupil on the same side as that on which the cervical sympathetic and trunk of the 3rd nerve were divided. As an extra precaution the superior cervical ganglion was excised.

Stimulation of sensory nerves. After dividing the sympathetic stimulation of the supra-orbital nerve caused dilatation of the pupil. When this had been clearly ascertained the third nerve was divided, and the supra-orbital stimulated at varying intervals up to one and a half hours after the operation. In no case did dilatation of the pupil follow. The experiment was performed eighteen times with the same result.

The results are in agreement with those of Angelucci and Anderson in showing that reflex dilatation of the pupil observed after section of the sympathetic ought to be attributed to an inhibition of the motor oculi, and not to stimulation of motor fibres contained in the fifth nerve.

Cortical stimulation. The authors find with Mislowsky that section of the cord and sympathetic do not prevent dilatation of the pupil; when the cortex or the angular gyrus is stimulated section of the third nerve is necessary in addition.

Stimulation of the third nerve. The disagreement in the results of different observers on this point is probably to be explained by two factors—first, the loss of excitability of the third nerve after division is so rapid that unless stimulation is applied almost immediately no effect on the pupil is observed (the degeneration of this nerve is more rapid than that of any of the other cranial nerves); second, the influence of the ciliary ganglion—which plays the part of an intermediate cell station between the central and peripheral neurons. The third nerve degenerates from the centre to the periphery, but the loss of excitability remains for some time limited to the trunk, and only after a considerable interval affects the post-ganglionic fibres, *i.e.*, the short ciliary nerves.

The authors have shown (confirming Langendorff) that the third nerve is excitable right up to its origin.

To recapitulate briefly:

1. Section of the third nerve and sympathetic is necessary in order to abolish reflex dilatation of the pupil, when a sensory nerve, such as the supra-orbital, or the cortex in the neighbourhood of the angular gyrus, is stimulated.

2. The fifth nerve plays no part in the transmission of the reflex.

3. Stimulation of the third nerve right up to its origin by means of faradic currents will produce contraction of the pupil.

The article, if it contains nothing new, is interesting as it confirms the work of others on this subject.

J. BURDON-COOPER.

TERRIEN and CANTONNET (Paris). The Formed Elements of the Blood in Iritis. *Archives d'Ophthalmologie*, May, 1907.

ACTING upon the suggestion of Prof. de Lapersonne the authors have undertaken the systematic study of the formed elements of the blood, and their variations in the different forms of iritis, hoping that the information so obtained might lead to a more accurate conception of the etiology and diagnosis of the disease. Thirty-eight cases were examined in which the diagnosis was more or less certain. Of these half were syphilitic; the remainder occurred as complications of influenza, blennorrhœa (due to the gonococcus), acute and chronic rheumatism and sympathetic ophthalmia. One was a case of traumatic iritis. Full details together with a tabulated statement of the blood count in each of the thirty-eight cases are given, and for these the original must be consulted, as it is not possible here to do more than briefly refer to the results.

In the case of traumatic iritis, the two cases of chronic rheumatism and the four cases of sympathetic ophthalmia, the variations from the normal blood count were so slight that no accurate conclusion can be drawn from them. The absence of leucocytosis in the four cases of sympathetic disease rather casts a doubt upon the researches of Zur Nedden indicating a toxic element in the blood of such patients.

Excluding the seven cases above referred to the remainder may be divided into two classes—syphilitic and non-syphilitic.

It is interesting to compare the mean values of the blood count in each of the two classes with one another and with the normal. In the following table this may be done at a glance. It ought to be said that the influence of age, menstruation and digestion upon the blood count has been allowed for:—

I.	II.	III.
Normal blood formula, after Jolly, Leredde, and Bezangon.	Mean blood count in 19 cases of syphilitic iritis.	Mean blood count in iritis from an acute infection, non-syphilitic.
IN ADULT—		
Red cells, 5,000,000	3,180,000 ...	5,021,000
Leucocytes, 6-7000	6,040 ...	12,710
Polynuclear leucocytes, 66-70 %	57·6 %	69·1 %
Lymphocytes, 29-30 %	27 %	21·7 %
Large mononuclear leucocytes, 4·5 %	13·2 %	8·4 %
Eosinophile cells, 1-2 %	2·2 %	0·8 %
Hæmoglobin	78 %	85 %
Total mononuclear leucocytes	42·2 %	30·9 %
IN THE CHILD—		
Lymphocytes, 40 %	—	—
Eosinophiles, 2·5 %	—	—
IN THE AGED—		
Polynuclear leucocytes, 70-75 %	—	—

The greatest difference is shown in the case of the leucocytes which are practically doubled in amount in the non-syphilitic cases. The eosinophiles are increased somewhat. The mononuclear leucocytes are increased while the polynuclear are diminished, but the reverse of this is true in secondary syphilis. That anæmia is present in syphilis is well known. The blood count in syphilitic iritis shows a decided anæmia with a normal leucocytic value, but the equilibrium normally maintained between the different varieties of leucocytes is disturbed, *i.e.*, there is a mononuclear leucocytosis. Iritis following in the course of acute infections (non-syphilitic) is characterised by the usual number of red cells, marked leucocytosis, but undisturbed leucocytic equilibrium; if the disturbance exists it is

usually on the side of a polynuclear leucocytosis. As far as this research is concerned the authors rightly admit that the results cannot be said to aid us much in arriving at the precise cause of an iritis, though in some cases it is possible that a blood examination may assist a doubtful diagnosis.

In conclusion therefore it must be confessed that we are in much the same place as before as far as the diagnostic etiology of iritis is concerned, but the reviewer cannot help thinking that if more time and attention were bestowed upon such physical properties as surface tension, osmotic pressure, electrical conductivity, etc., of the liquid part of the blood and less upon its fixed elements (which are after all only indicators) it is far from improbable that our knowledge of the etiology, diagnosis, and treatment of one or two eye affections which are at present obscure would be enriched and the worker reap a reward.

J. BURDON-COOPER.

FORTIN. A New Method of Examining Entoptically the Retinal Circulation and Fovea. *Comptes Rendus de la Société de Biologie*, March and June, 1907.

FORTIN has devised a new method which makes observation of the circulation in the retinal capillaries easy. He makes use of the mercury vapour lamp. The spectrum of this source of light shows four bright bands, two of which are in close proximity in the blue. The other two can be suppressed by the interposition of a screen of cobalt gelatine. In this way a monochromatic light of very high intensity is obtained. Looking at such a source of light the visual field seems to be in a state of ebullition; on all sides the retinal capillaries are seen as brilliant convoluted tubes running in all directions, appearing and disappearing with great rapidity. Now and then the lumen of the capillary is seen to be obliterated by small black spherical bodies, either isolated or following one another in succession. These are the red blood corpuscles; occasionally a white corpuscle is visible. No vessels are seen in the immediate vicinity of the fixation point.

In order to examine the detail of the foveal region it is better to close the eyes for a few minutes and then interpose a piece of blue glass between the eyes and the light before looking at it. The vessels surrounding the fovea then appear black on a background of blue, afterwards dark blue on light blue, and finally

the detail disappears altogether. The fovea shows up as a dark slightly oval area with its major axis horizontal. It is surrounded by the bifurcations of the retinal capillaries. The dark area is seen to be covered by a number of small brilliant circles disposed close together, giving rise to a mosaic appearance (the granular aspect of Helmholtz). It is difficult to count the number of them exactly, but an approximate estimate can be made. This observation is interesting as it indicates that the fixation point is situated in the centre of the foveal area. If yellow glass be interposed between the light and the eye the effect is different; the fovea then appears brighter and the surrounding area dark, but the details are no clearer. The dark appearance of the foveal region when it is exposed to blue light is easily explained, according to Fortin, by the experiments of Charpentier and Polak, and by the observation of the writer, viz., that a small blue flower in a green field cannot be seen blue when it is fixed.

Fortin is seeking to devise some ready method by means of which the appearances above described may be projected upon a background by means of pure spectral blue light so that an intelligent patient may be able to give an account of what he observes entoptically of the structures of the vitreous and fovea and the various phases of the circulation of the blood in the retinal capillaries—a method of examination which promises to be both interesting and valuable.

J. BURDON-COOPER.

CLINICAL NOTES.

SOME EXPERIENCES WITH DIONINE. *Wochenschrift für Therapie und Hygiene des Auges*, Nos. 11, 23 and 32.

v. Arlt (Vienna) had obtained in his early use of dionine no more satisfactory results than have been published by many. The method was to drop the dionine solution into the conjunctival sac and prescribe a weaker solution for use by the patient at home. Most observers found that the effect of the drug soon wore off, and the patients became immune to its action, in fact the drug was inert to them. Lately he has had under observation for some six months two cases of high myopia with hæmorrhages about the macula, for which he used dionine as a resolvent. He placed the powder directly on the eye by means of a little spoon calculated to contain 0.005

gramme, and to equal one drop of a 10 per cent. solution. This was done once a week only, and the introduction of the powder was followed by gentle massage of the eye. From an experience of this method during six months he concludes—(1) that with an intermittent use dionine will retain all its activity towards the patient, without any increase of the dose, for many months; (2) that old corneal nebulæ, especially those resulting from early phlyctenular conjunctivitis, may be cleared up by this means; (3) that in cases of hæmorrhage in the retina in high myopia the use of the drug was followed by an absorption of the blood with deposit of pigment, and a return to their normal state of vessels which had been previously distorted; he recognised that these favourable results have been noted to occur without the use of dionine, and that to establish his belief in the superior benefit following dionine extended observations are required; (4) that old changes at the macula lutea, the results of hæmorrhage, are not affected by dionine.

Dr. Joh. Kayser (Amberg) is an enthusiast in the use of dionine. He gives brief data of twenty selected and "specially striking" cases in which the vision, by reason of central corneal ulcers, had been reduced to $\frac{5}{10}$ to $\frac{5}{50}$. In these cases he exhibited dionine, and in a very few months a marked improvement in the vision was recorded, $\frac{5}{5}$ to $\frac{5}{10}$ being the usual result. He says he uses the solid dionine, together with atropine and hot compresses, in all cases of severe ulceration and iritis; but he gives no details of his mode of exhibition. Dionine has become for him an absolutely indispensable drug in his practice and he uses it daily in all sorts of cases.

Senn (Wil, Switzerland) has a lengthy but interesting paper on a couple of cases of glaucoma where the use of dionine threatened to be disastrous. The first was that of a young woman aged 24 years, who suffered from chronic glaucoma. The fields were reduced to 10 to 20 degrees from the fixation point and the visual acuity to 0·2. Eserine he found acted well, the pupils were contracted to pin-point size and the tension became normal. Subsequently he placed in the conjunctival sac some dionine ointment of 10 per cent. strength, together with the eserine, with the purpose of keeping up this favourable state; but the pupils rapidly dilated to 7 mm., the tension rose and the visual acuity was diminished to 0·05. It took 48 hours to reduce these dangerous symptoms by using 1 per cent. eserine at first four times an hour and then every second hour. At a later time he repeated the use of the dionine ointment and

the same untoward effects were produced. As a control he tried the effect of the drug on his son, a healthy youth of 14 years. Eserine contracted the pupil and the dionine increased the effect. The second case was that of an older woman, who suffered from frequent relapses of irido-cyclitis. There were posterior synechiæ of tough and long-standing character. Atropine and cocaine was badly borne, but scopolamine was satisfactory. In the last attack there was much exudation into the vitreous, some infiltration in the substance of the cornea and an increase of tension. He used 10 per cent. dionine with the scopolamine, but the effect was to cause great irritation. The exudation increased, the tension and pain were greatly exaggerated, and the condition was worse than it had been before. Discontinuing the use of dionine a cessation of the trouble followed. At a later date he again used the dionine and the results were identical. By eliminating every other possible cause he was convinced that the dionine was the active agent in producing this serious increase of tension. Discussing the manner in which dionine acts, he suggests that, by reason of the chemosis it causes, and the immense dilatation of the lymphatics, there is a definite blocking of the anterior ciliary veins from pressure upon their walls by the engorged connective-tissues, and that this effect is likely to be particularly dangerous where, as is certainly the case in glaucoma secondary to uveal disease, there is already some loss in the permeability of the channels of escape for the aqueous, and in the sub-choroidal veins and in the perivascular lymph-paths of the central vessels. From his experience he recommends that dionine should be used with the greatest circumspection in cases of glaucoma, and that it should not be used where there is uveal disease.

N. BISHOP HARMAN.

OPERATION FOR ENTROPION.—Heard (Major, I.M.S.) finds this fault with the ordinary operations for entropion that they are apt to affect beneficially only the central portion of the lid and to leave the parts nearer the two canthi without benefit. He finds it best to make an intra-marginal incision about 7 mm. deep, then a skin incision parallel to the lid margin and about 2 mm. above the line of hairs, and, lastly, another skin incision, joining the two ends of the other in a form exactly like the line of the posterior edge of the palate and uvula. The nates-like piece of skin (if one may be allowed to call it so) thus marked off is dissected off and the edges united; the height of

the "palatal" incision depends of course on the amount of effect the operator wishes to produce.—*Indian Medical Gazette*, June, 1907.

Three recently published papers deal at least in part with the same important fact, that in certain cases some form of auto-intoxication is the cause of choroiditis. Both authors quote from Elschnig, of course, for he was the first to place so much stress on this morbid condition as a cause of several types of eye disease, but while de Schweinitz seems to agree with him that as a cause of choroiditis or irido-choroiditis, gastro-intestinal auto-intoxication is far from rare, Bull regards this as much less frequent. The last-mentioned states that the patches of exudation in the choroid in such cases present a very different appearance from that of choroiditis disseminata, or from that of the chorio-retinitis associated with general constitutional syphilis. All the cases, he says, "presented the usual ocular symptoms of conjunctival injection, paralysis of accommodation and mydriasis, but in addition the fundus presented an unusual picture. Scattered over all the fundus of both eyes were patches of yellowish-white exudation in the choroid, of varying size and shape, very flat, with scarcely any elevation above the general level of the fundus. . . . The older patches were surrounded by a reddish margin, but no masses of pigment could be seen anywhere in the fundus, and no retinal or choroidal hæmorrhages. The vitreous remained entirely clear, and the vision was but slightly affected, showing that the retina was but little, if at all, involved in the process." Accompanying this process in all Bull's cases was an eruption, especially on thighs and abdomen, of bullæ: from such bullæ, he says, Elschnig and Valude have isolated a diplococcus. De Schweinitz thinks it more than possible that in some cases of choroiditis the cause has been an infection which has gained access through the tonsillar tissue, and through the lymphatics of the neck to the eye.

C. S. Bull (New York). "Rare Forms of Choroiditis." *New York Medical Record*, May 4, 1907.

G. E. de Schweinitz (Philadelphia, U.S.A.). "Auto-intoxication in Relation to the Eye." *Journal of the American Medical Association*, Chicago.

G. E. de Schweinitz. "Choroidal Diseases: their relation to General Diseases and particularly to Infections, Intoxications and Auto-intoxications." *Annals of Ophthalmology*.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED
KINGDOM.

Meeting held June 13th, 1907.

The President, Mr. PRIESTLEY SMITH, in the Chair.

CARD SPECIMENS.

*Detachment of the Retina, with numerous Cysts, in a Glaucomatous Eye.
Epithelial Downgrowth Covering the Anterior and Posterior Surfaces
of the Iris.*—Mr. L. Werner.

The only clinical history available in this case was that the eye was removed for absolute glaucoma, which was evidently of a secondary nature the result of irido-cyclitis.

The microscopical sections of this case showed a completely detached and much-folded retina containing numerous cysts. There were other spaces in the nuclear layers, but these were not connected with the retinal cysts, which seemed to be formed by the coalescence of neighbouring folds with subsequent disappearance of the intervening septa. The contents of the cysts were fluid. There was some hyaline thickening of the vessel walls. On the anterior surface of the iris was a layer of stratified epithelium somewhat similar to that covering the front of the cornea; this was continued round the pupillary margin on to the posterior surface, where it became thinner and was ultimately reduced to a single layer on approaching the ciliary body. There was also an endothelial-like membrane behind the lens reflected from the ciliary body. The angle of the anterior chamber was closed. The lens was degenerated. The growth of this epithelium was difficult to explain as there was no history of a wound to account for any downgrowth into the anterior chamber.

Neuro-Fibromatosis of the Fifth Nerve, with Buphthalmos.—Dr. G. Sutherland and Mr. M. S. Mayou.

This was the case of a boy, aged 6, who at birth showed some irregular pigmentation of the skin. When six months old, some small nodules appeared on the back and near the outer angle of the right eye, and at three years old the right side of the face was a good deal larger than the left. The boy appeared delicate, with marked scoliosis; the head was large and square with the bony prominences well marked. The whole of the right side of the head was enlarged, both bones and soft tissues being much thickened. The branches of the third division of the fifth nerve could be felt like cords. The right eye was pushed downwards and forwards by swelling in the orbit; there was slight ptosis, and enlargement of vessels beneath the skin of the upper lid, and some

tendency to ectropion of the lower lid. The whole eyeball was much enlarged; the cornea was clear, but at the limbus several white streaks passed inwards for 2 or 3 mm. and appeared to be enlarged ciliary nerves. The iris showed *ectropion uree*; the tension was full, and the disc cupped; the vision was finger counting at 2 ft.

Cases of a similar nature (Fibromatosis of the fifth nerve) have been described before by S. Snell and E. Treacher Collins in the *Transactions of the Ophthalmological Society*, Vol. xxiii., p. 157, by Verhoef in the same place, by Sachs alber in *Beiträge zur Augenheilkunde*, xxvii., p. 523, and again by E. Treacher Collins and R. Batten in the *Trans. of the Oph. Soc.*, Vol. xxv., p. 248.

Leber's Disease; Family Optic Atrophy in Mother and Son.—Mr. Arnold Lawson.

The mother showed optic atrophy of Leber's type in the left eye, while the son presented the same condition in both eyes.

The mother had attended the Royal London Ophthalmic Hospital in 1890, when the vision of the right eye was $\frac{6}{12}$, and of the left finger counting at 25 cm.; the note made at that time was that there was pallor and cupping of the optic disc; the fields of vision were not recorded.

The fundus of the left eye at the present time shows much the same changes as at that date, and the right is normal. The peripheral fields are both normal with the exception of slight upward and inward limitation of the left. There is a large central scotoma.

The boy is aged 10, and the vision of the right eye is $\frac{6}{60}$, that of the left being $\frac{6}{36}$. Ophthalmoscopic examination reveals striking pallor of the temporal half of both discs, more marked in the left than right. The visual fields are normal, and both eyes show a central scotoma for colour.

There is one other child, a girl, who is not affected in any way.

Bilateral (? Congenital) Anæsthesia of the Conjunctiva and Cornea.—Mr. J. B. Lawford.

Lily W., aged 6, came to St. Thomas's Hospital on April 19th, 1907, with the history that the left eye had been inflamed off and on since she was 2 years old. There had never been any serious illness, nor was there any specific history. On the left cornea was a large, shallow, irregular ulcer, but no hypopyon and very little congestion. Complete protection of the eye with pad and bandage and instillation of mydriatic effected a cure in 3 weeks. The special feature about this case was the presence of anæsthesia of the conjunctiva and cornea on both sides, though only the left cornea suffered. Sensation tested with a horse

hair with a bending strain of 1,200 milligrammes showed some feeble sensation of the lower, inner, and outer bulbar conjunctiva and of the inferior palpebral conjunctiva. The bulbar conjunctiva of the left eye was entirely insensitive, and the inferior palpebral conjunctiva was also insensitive but less so than the right. There was no loss of sensation in the skin or any other mucous membrane supplied by the trigeminal nerve.

Pemphigus of the Conjunctiva and Xerosis.—Mr. Hosford.

This was a case of pemphigus, beginning in December 1905. At the present time the right cornea is opaque and the eye has only light perception remaining, and the left cornea is becoming invaded. There is a history of several attacks of pemphigus of the skin in other parts of the body.

Traumatic Dislocation of the Lens into Vitreous.—Mr. Charles Blair.

PAPERS.

A history of Night Blindness in 9 consecutive generations.—Mr. E. Nettleship.

Mr. Nettleship presented a genealogical tree in which congenital stationary night blindness, without any ophthalmoscopic changes, occurred in nine successive generations extending over a period of 250 years. A great part of the work had been published nearly 70 years; but the fresh enquiry instituted by Mr. Nettleship resulted in the extension of the family tree so as to include nearly 1,800 people in ten generations. Only certain branches showed evidence of the disease, and just one half were affected, contained in 60 childships. In half the affected childships (viz. 29) the proportion of the diseased to healthy agreed with the Mendelian theory, while about a quarter of the cases seemed inconsistent with it. The disease always passed from parent to child without a break, was rather commoner in females than males, did not lead to blindness, and was not due to consanguinity.

Mr. Bateman, of Cambridge, remarked that Mr. Nettleship has shown that the disease always descended through an affected person, which fact excited a presumption that the condition was one which, following the Mendelian terminology, might be called a dominant character. By that was meant merely that if a germ cell bearing the character (*e.g.*, night blindness) met a normal germ cell, then the offspring resulting from this fertilization or union would exhibit the character and eventually develop night blindness. Those which did not exhibit the character did not transmit it. The suggestion that night blindness was a Mendelian dominant might be tested in 2 different ways; the first was by the simple evidence that it was transmitted only by the affected; and the

second test involved the knowledge of large numbers of families which were the offspring of affected persons mated with unaffected. If it were of the simplest Mendelian kind, then the offspring of affected married to unaffected ought to contain an equal number of each. This was not the case in Mr. Nettleship's observations. One point that struck him was that Mr. Nettleship showed that the descent was through affected to affected, whereas previous observers showed descent through unaffected females to males who again developed the defect.

A peculiar case of Subretinal Cysticercus.—Dr. L. Werner.

Mr. Werner exhibited coloured ophthalmoscopic lantern slides and microscopical sections of a case of sub-retinal cysticercus. After alluding to cases previously described, he pointed out that in no former record had the opportunity been afforded of an ophthalmoscopical examination together with a microscopical section. The patient, a young man, aged 19, came for advice on November 25th, 1905, with the history of failing sight in the right, first noticed 3 months before.

There was nothing abnormal on external inspection; the tension was normal, and the vision was counting fingers at 1 metre. On ophthalmoscopic examination there was a large spherical tumour 5 or 6 times the diameter of the optic disc situated on the nasal side of the disc and reaching to just above its upper margin. It projected well into the vitreous, and had a bluish-white shiny appearance. The optic disc itself was indistinct and swollen, there was no general dilatation of the vessels, but there was one which was enormously dilated (about $\frac{1}{3}$ the breadth of the disc), and this after pursuing a very tortuous course suddenly disappeared into the tumour by a small depression. Situated at the lower and inner part of the swelling was a large hole the depth of which could not be gauged. Towards the periphery was a large detachment of the retina of the ordinary type. The diagnosis was doubtful, and treatment was postponed. The boy left the hospital, and did not return again for 2 months. Vision was then only hand movements and the peripheral detachment had increased. Under the circumstances the eye was excised; and on microscopical examination the case was found to be one of intra-retinal cysticercus. In sections taken at the lower part of the tumour there was nothing to indicate its place of origin, but higher up the sections revealed clearly in which layer it had developed. What appeared by the ophthalmoscope to be a hole turned out to be a mass of extremely vascular granulation tissue extending from the anterior to the posterior wall of the cyst, forming a pillar of tissue inside the cavity. The vascular supply of this granulation tissue came from the large tortuous vessel before mentioned, which measured 0.27 m.m. in diameter. There were no hooklets found, and the diagnosis rested on

finding the more or less degenerated remains of the head and neck and a well preserved sucker.

Subretinal cysticerci generally perforate into the vitreous; the present one was found in an unusual position, and was probably the cysticercus cellulosa.

Professor Sattler remarked that several cases had come under his notice, 4 of which he had operated on; and he had 3 specimens showing the head protruding out of the bladder.

(a) *A case of Metastatic Tumour of the Choroid.*—Mr. Whitehead.

A mammary tumour, which had been present 2 years, was removed seven months ago. Recurrence took place in the scar, and many metastatic tumours appeared in various parts of the body. Vision in the right eye failed, and after 4 weeks the eye became blind and glaucoma set in. The eyeball was excised, and a flat growth was found in the choroid. Microscopically, the growth was found to consist of closely packed spindle shaped cells and fibrous tissue between irregular groups of tumour cells.

(b) *A case of Multiple Cysts of the Retina associated with Glaucoma.*—Mr. Whitehead.

Vision in the affected eye had always been bad, for 3 months there had been complete blindness, and for 2 months glaucomatous symptoms had been present. Examination of the eyeball after excision revealed no intraocular growth, but numerous translucent cysts in the retina, which was not detached. These appeared to be lymphatic cysts, developed within the retina, and separating its layers. The relation between the cysts and the glaucoma was not clear.

In the discussion which followed on these 2 cases Dr. Rockliffe referred to a case shown by him in 1901, and described its subsequent history. The original injury to the breast was in 1898, the breast was removed in 1900, the left eye was affected a year after this, the right eye 3 months later, and in 3 months the patient died.

Mr. L. Werner described a case of cysts of the retina with glaucoma, but in his case the glaucoma was secondary to iridocyclitis.

Mr. C. D. Marshall considered that metastatic carcinoma was probably not so rare as it was supposed to be; it might be present in the later stage and not observed owing to the severity of the general illness.

Mr. Whitehead, in his reply, said that, judging from his own observation, he could not agree with Mr. Marshall's suggestion.

Meeting on July 12th, 1907.

The President, Mr. PRIESTLEY SMITH, in the chair.

CARD SPECIMENS.

Congenital Opacity of the Cornea in 3 members of one family.—Mr. Angus McNab.

All three had suffered from bad sight since early childhood, the eldest brother having had "miliness of the eyes when only a few months old." The family history showed that the mother had had 16 pregnancies, three of which resulted in miscarriages. Only 6 of the family are now living. Besides the 3 cases under observation one child has posterior polar cataract.

The ocular changes presented by the patients consisted in superficial fine granular spots in the centre of the cornea without any trace of vessels, the condition resembling that known as nodular opacity of the cornea.

Symmetrical Changes in each Fundus.—Mr. Sydney Stephenson.

Abraham S., aged 9, was first seen on June 27th, 1907, with the history that 14 days ago the teacher had noticed the boy could not see the board at school. The vision in the right eye was $\frac{3}{24}$, improved to $\frac{5}{5}$ with correction, and in the left $\frac{5}{18}$ improved to $\frac{5}{5}$ with correction. There was a faint zonular cataract in each, and symmetrical changes at the yellow spot. These consisted of an unusually dark granular appearance of the fovea surrounded by a well marked "halo," while the yellow spot itself was pale grey and strongly suggestive of a depression. A coloured drawing illustrated the condition.

Solitary Quiescent Tubercle in the right eye associated with Tubercular Glands in the Neck.—Mr. L. V. Cargill.

A girl, aged 20, came for advice in January, 1907, on account of refractive error. Correction of her hypermetropic astigmatism gave $V = \frac{6}{6}$ in each eye. On making a routine examination of the fundus there was seen in the right eye a white, somewhat prominent area, a little larger than the disc, and about 1 disc diameter above it. Its surface was sprinkled with some fine specks of pigment, and a small branch of the ascending nasal artery crossed it. At the upper edge there was absorption of choroidal pigment and at the lower edge were one or two spots of pigmentation. There was no detachment, and no other changes, and the fundus and media in the other eye were normal.

The family history showed her to be the youngest of 12, of whom 4 died young, while the rest of the children and the parents are living and healthy.

The patient had had six operations for tubercular glands in the neck.

and there was extensive scarring in that region. The only other serious illness was congestion of the lungs, in 1895.

A case of Thiersch-grafting for Symblepharon the result of Pemphigus—7 years after the operation.—Mr. Arnold Lawson.

This case was exhibited before the Society some years ago, and is found recorded in the *Transactions*, vol. xxi., p. 157. The left eye has kept quite well, the movements of the globe are unimpeded and the vision is as good as ever, there has been some increase in the conjunctival contraction, but no symblepharon.

In the right eye the shrinking had gone on more rapidly so that a second operation had to be performed 2 years ago; this was followed by complete relief, the vision remaining good.

It was noticeable in this case that the conjunctival contraction had been mostly confined to the lower sacs and lower bulbar conjunctiva in each eye.

PAPERS.

My Combat against Blindness.—Dr. Fukala (Austria).

This paper dealt with several different eye conditions, such as scleritis, marginal blepharitis, etc., which were treated with much stronger solutions than are usually recommended, the method of application being to paint round the lids, or the sclerotic near the cornea, according to the character of the case, after previously anæsthetizing with cocaine.

Three cases of Uniocular Optic Neuritis in Boys, with Complete Recovery of Vision.—Mr. W. H. H. Jessop.

The paper described the cases of three boys aged 12, 17, and 14, who developed one-sided optic neuritis with 1 m.m. of swelling of the disc; the vision was reduced to finger counting, but subsidence of the neuritis, and complete recovery of normal vision took place in all cases.

No cause could be found in two cases, but in the third, 2 months after the papillitis commenced, an abscess burst and discharged into the rectum. There was a marked central scotoma in each case.

The recovery took place under treatment with mercury ointment, iodides internally, and peacock green glasses; 2 of them clearing up in 2 months and one in 4 months.

In the discussion which followed, several similar cases were mentioned, including one which Mr. Holmes Spicer had seen many years ago at Moorfields, where even perception of light had been lost in the affected eye with subsequent complete recovery of normal vision. There was 4 D of swelling of the disc, accompanied by great pain in and about the orbit.

MALCOLM L. HEPBURN.

A PRELIMINARY COMMUNICATION ON THE PATHOGENESIS OF GLAUCOMA AND THE RATIONALE OF ITS TREATMENT.*

By THOMSON HENDERSON, M.D., Nottingham.

WHILE the clinical features and pathological anatomy of glaucoma are well known, the *causa causans* has always been a matter of conjecture.

In this preliminary communication I wish to direct attention to the fact that the underlying predisposing and causal factor of glaucoma exists in a primary obstruction and closure of the pectinate ligament. This occlusion is brought about by a sclerosis of the fibrous structure composing that filtration area, which results in, first, a diminution, and, finally, a complete obstruction of the outflow through that channel.

All the other phenomena of glaucoma, clinical as well as pathological, follow as consequences of this primary closure of the pectinate ligament.

THE PECTINATE LIGAMENT.

The pectinate ligament is, at birth, composed of a fine stroma of cells forming a delicate network on the inner side of Schlemm's canal. In this network it is not easy to differentiate young connective tissue from the endothelial cells. As years go on the connective tissue cells of this trabecular arrangement gradually undergo fibrosis, while at the same time the endothelial cells lining the alveoli lay down a homogeneous membrane in exactly the same way as Descemet's membrane is formed and *pari passu* with it, thus giving rise in adult life to the appearance of the splitting up of that membrane into the fibres of the

* Read before the British Medical Association (Ophthalmological Section), Exeter, August, 1907.

pectinate ligament. This sclerosis, which is absent in the structure of the pectinate ligament of a child of five, when the eye is said to be of full size, and most marked in a man of fifty, is a purely physiological process, such as is common with advancing years in many connective tissues in the body. In the case of the pectinate ligament a further cause for fibrosis is to be found in the traction on it of the ciliary muscles, a traction which is most marked in hypermetropic eyes.

It is in this histological difference between the structure of the pectinate ligament in the eye of a child and of an adult that the key to the pathogenesis of primary glaucoma lies.

Glaucoma, it is now universally recognised, follows from a difficulty in the escape of the intra-ocular fluids. The hindrance to the aqueous outflow does not, however, arise from the peripheral anterior synechia so frequently met with in this condition—which, as will be explained later, is a secondary manifestation,—but the obstruction is brought about by the closing of the inter-spaces of the pectinate ligament in consequence of the fibrosis of the cells of its connective tissue stroma and continued formation of a homogeneous membrane around these fibrous bundles, leading to the endothelial cells being first brought into contact, and then welding together the fibrous structure.

THE IRIS.

The iris has always been looked upon as a mere movable shutter whose only function is to regulate the amount of light entering the eye. It subserves, however, another and equally essential rôle in the internal economy of the eye, by acting as an absorbing surface, accessory to but no less important than the pectinate ligament itself. For this

purpose the loose stroma of the iris is admirably adapted, as well as its large blood supply, which is quite out of proportion to its requirements as a diaphragm. My anatomical observations are quite in accord with the experimental investigations of Nuel, Paterson and others, who have shown that inky fluids injected into the anterior chamber are taken up by the whole of the iris surface, but especially so where the iris crypts are most numerous, *i.e.*, at the pupillary and ciliary margins.

The importance of this fact from a practical and clinical aspect has not been appreciated, and I shall therefore refer to it again later.

THE AQUEOUS.

The aqueous fluid is not a true secretion but, as recent research has shown, a transudation derived from the vessels of the ciliary body, and, what is a most important point, its rate of formation depends directly on the arterial blood pressure.

Normally any increased inflow is met by a corresponding outflow, so that the balance of the intra-ocular tension is not disturbed. It is this balance that is deranged in glaucoma, by the available filtration area through the pectinate ligament being first diminished and finally closed, thereby throwing a greater proportion, and finally all the work of drainage on the iris. The superficial and absorbing surface of the iris varies inversely with the size of the pupil, but more important than the mere superficial area is the fact that with a dilated pupil the iris crypts are closed, while with a contracted one they are opened and so allow of free drainage.

ACUTE GLAUCOMA.

Acute, so-called inflammatory, glaucoma is precipitated, as is well known clinically, either by mydriasis, or by

mental and physical conditions which increase the general or local blood pressure in an eye predisposed to glaucoma, *i.e.*, in an eye in which the available filtration space through the pectinate ligament is already diminished. The result of an increased blood pressure under such circumstances is the production of an increased amount of aqueous, which cannot find a ready means of escape except by way of the iris.

The raised intra-ocular pressure causes increasing difficulty of the venous return, and this, in the case of the iris, is followed by its becoming swollen, œdematous and congested. It is as a result of this condition that the iris root becomes applied to the pectinate ligament.

The blocking of the angle of the anterior chamber is therefore a consequence of the acute iritic œdema and not the cause of the glaucomatous onset.

The pressure on the venæ vorticosæ likewise results in œdematous swelling of the ciliary bodies and consequent relaxation of the fibres of the suspensory ligament of the lens to which they are attached. The lens thus relieved from their restraining influence, assumes a more globular form, thus accounting for the shallowing of the anterior chamber in acute glaucoma.* All the other manifestations of the glaucomatous attack, both clinical and pathological, follow as the result of venous obstruction and stasis.

SUB-ACUTE GLAUCOMA.

In sub-acute glaucoma the same agencies are at work, only the balance between inflow and outflow is kept more even. The iris root may or may not at first form a per-

* As Priestley Smith has shewn, the lens continues to grow throughout life; there is, therefore, always a shell of flexible fibres surrounding the sclerosed nucleus of the lens. The suspensory ligament is not attached directly to the ciliary muscle, but arises from the *pars ciliaris retinæ*, between which and the muscle is interposed the connective tissue stroma of the ciliary body; this stroma, as well as the connective tissue surrounding the bundles of the ciliary muscle, becomes sclerosed in advanced life, a process which may play a part in the development of presbyopia.

manent anterior peripheral attachment, but when such is once formed each subsequent attack will cause more and more of the swollen and congested iris to become first applied and then adherent to the posterior surface of the cornea.

CHRONIC GLAUCOMA.

In chronic, so-called non-inflammatory, glaucoma adhesions occur late in the disease and often not at all. This is due to the fact that the process of sclerosis which leads to closing of the interstices of the pectinate ligament and welding together of its trabecular structure is a slow and lengthy one—a matter of years—so that in this chronic type of glaucoma the increase in the intra-ocular tension is almost imperceptible. The drainage *viâ* the iris and ciliary body is sufficient to obviate an explosive, *i.e.*, congestive attack, but not ample enough to prevent an increase of pressure sufficient in time to destroy and disorganise the finer and more delicate structures within the eye. Such an eye at the end may show a perfectly open angle of the anterior chamber with a pectinate ligament which is closed and sealed up. Buphthalmos is the infantile form of this condition, in which, through some anomaly, congenital or otherwise, the pectinate ligament becomes closed early, resulting in the raised intra-ocular tension causing stretching and enlargement of the globe.

TREATMENT.

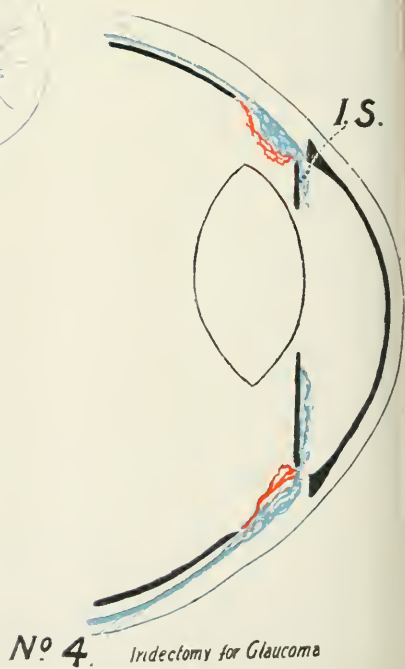
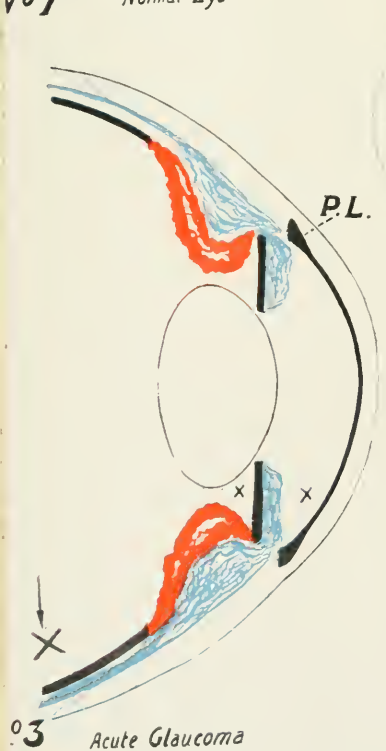
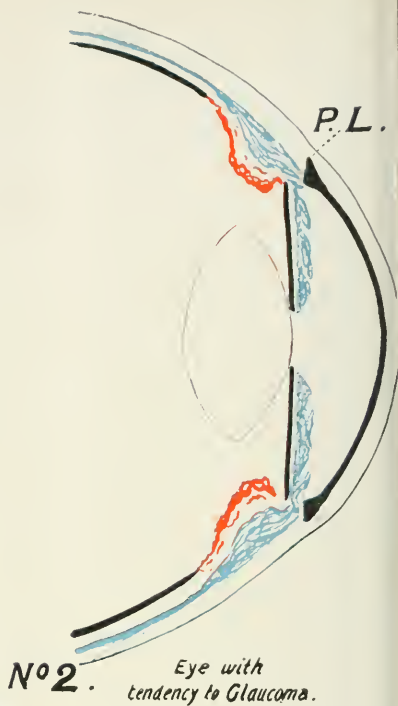
The treatment of glaucoma has been purely empirical and therefore has always been uncertain. The only definite fact established is that the greater the structural alterations in the iris the less treatment avails. As insisted on above the iris is an absorbing surface, and it is on this fact and on this alone that medical and surgical measures depend for their success.

The beneficial action of myotics is therefore to be accounted for, not by their opening up a filtration area through which there is little or no filtration, but by their causing contraction of the pupil and so opening out the crypts on the iris surface, thereby allowing the aqueous to find a ready way out. *Per contra* mydriatics, by causing dilatation of the pupil and consequent closing of the crypts, precipitate glaucoma. Psychic disturbances, by their action on the pupil, produce similar baneful results.

The efficacy of iridectomy has been explained by many theories—theories which it is unnecessary to discuss here. In a paper in the July number of the *Ophthalmic Review* I have pointed out the peculiar and hitherto unrecognised fact that after an iridectomy the iris stump shows no signs or vestiges of a cicatrix whatsoever, and that the appearance of an iridectomy stump years after operation is as if it had been performed *post mortem*. The application of this fact to glaucoma is obvious. The operation of iridectomy opens up a permanent channel for the intra-ocular fluids to drain away—a channel which will not be influenced by the state of the pupil, and which will always be effective if the operation is performed before the iris tissue becomes atrophied and degenerated.

CONCLUSION.

In concluding I would summarise my views by asserting that the only difference between the various forms of primary glaucoma is one of degree, as the same pathological process underlies them all, namely a primary sclerosis and occlusion of the meshes of the pectinate ligament, and that this is a simple continuation of the fibrosis of the pectinate ligament which goes on throughout life. I might add that in secondary glaucoma a similar obstruction is brought about by inflammatory products.



DESCRIPTION OF DIAGRAMS.

Red=Arterial Area and Aqueous Inflow. The transudation of the aqueous by the ciliary body depends directly on the arterial blood pressure.

Blue=Venous Area and Aqueous Outflow.

Black=Passive Areas of the Iris Epithelium and Corneal Endothelium, and in Figs. 2, 3 and 4 the occluded Pectinate Ligament.

Fig. 1. Aqueous Outflow in the Normal Eye, which takes place not only through Schlemm's Canal but also through the Iris, Ciliary Body and Venæ Vorticosæ.

Fig. 2. Available Outflow in an eye with tendency to Glaucoma, *i.e.*, in which, through fibrosis, there is obstruction of filtration through the Pectinate Ligament (P.L.). The work of drainage is thrown on the Iris and Ciliary Body.

Fig. 3. Acute Glaucoma. Increased blood pressure causes increased transudation of Aqueous, which can not readily get away owing to the obstruction of the Pectinate Ligament (P.L.). The resulting increased intra-ocular pressure produces difficulty in the venous return, hence swelling and œdema of the Uveal Tract. This in the case of the Iris causes the apparent "blocking of the filtration angle."

Fig. 4. Iridectomy for Glaucoma. Through the Iridectomy Stump (I.S.) the absorbing area is increased and made more efficient owing to the raw surface presented to the aqueous by which it can readily escape.

Fig. 5. Surface view of Iris showing extent of cut area forming the base and pillars of the Coloboma.

TWO UNUSUAL FORMS OF AMBLYOPIA.

By LEWIS McMILLAN, M.D., Glasgow.

I. *Cocaine Amblyopia.*

J.L., aged 49, an iron turner to trade, came to see me on the 24th of May, 1906, complaining of dimness of vision for both distance and reading. He had never worn glasses and had "splendid sight" until about six weeks or two months previous to his visit, when he noticed that his sight had failed suddenly, in two days' time, after the use of a local anæsthetic for cautery applications to his nasal mucous membrane. Through the courtesy of the surgeon I have ascertained that the applications were made four times at intervals between 20th January, 1906 and 24th March, 1906, three times of cocaine and once of stovaine. The strength of the cocaine solution used was 15 per cent., of stovaine 20 per cent. The application was made by means of swabs, which were left in contact with parts to be operated on for a variable time.

The patient stated that he felt the applications of the cautery extremely painful in spite of the anæsthetic, that he lost a good deal of blood thereafter, that he staggered as if drunk, and always vomited on the way home.

He had not been well for a year or more. Two years ago his weight had been 10 st. 4 lb., at date it was 8 st. 13 lb. Examination of the heart revealed a ventricular systolic murmur, heard all over the cardiac area. He had no headaches, no giddiness, and no vomiting attacks when seen; was practically a teetotaler, but smoked from 2 to 3 oz. of brown twist in a week. The urine contained neither albumen nor sugar.

The tension of both eyes was normal, and the pupils re-

sponded to light. The visual fields for white were not contracted, but there was a central colour scotoma for red with the right eye, not with the left eye, but he called green a blue colour. The central visual acuity of the right eye was $\frac{5}{60}$, that of the left $\frac{5}{24}$.

Ophthalmoscopic examination of the right eye showed H. of about 1D., the disc palish, striated at the upper margin, without any glaucomatous cupping; of the left eye, H. about $\cdot 50$ D., and the disc similar in appearance to that of the right eye. No abnormality of either fundus was noted otherwise.

By way of treatment, tobacco was prohibited, glasses of +2.5D. were ordered and a mixture containing potassium iodide and strychnine was given.

12th June, 1906. R.V. = $\frac{5}{24}$ some letters, L.V. = $\frac{5}{18}$.

9th August, 1906. R.V. = $\frac{5}{12}$. L.V. = $\frac{5}{9}$.

18th September, 1906. R.V. = $\frac{5}{9}$. L.V. = $\frac{5}{6}$ some letters.

18th December, 1906. R.V. = $\frac{5}{9}$. L.V. = $\frac{5}{6}$, fairly well.

23rd July, 1907. R.V. = $\frac{5}{6}$ letters. L.V. = $\frac{5}{6}$.

Central perception of red and green correct with either eye. Has been smoking since December $1\frac{1}{2}$ oz. brown twist per week.

In spite of the close resemblance to a case of tobacco amblyopia, I think that the anæsthetic had a good deal, if not everything, to do with the onset of symptoms. The sudden onset, the close association of the two conditions in the patient's mind (an intelligent one), the rapid recovery and retention of normal vision in spite of a return to the use of tobacco, all point to some other cause than tobacco; while as predisposing factors have to be borne in mind the state of health of the patient at the time of operation and the shock of operation.

II. *Lightning Amblyopia.*

I am indebted to Dr. Freeland Fergus for permission to publish the following case which occurred in his practice while I was on duty for him.

7th August, 1906. Five days ago Miss K., aged 23, sat at a window (closed) for about two hours watching a thunderstorm, which was said to have been the most severe seen in the district for 30 years. On the following morning she felt her left eye painful when rotating her eyeballs, her vision was affected, and she had pain also behind her left ear. This latter pain had disappeared at the date of her visit, but pain was still complained of in the left eye when rotated. Tension was normal in both eyes and there was no tenderness on pressure. The irides responded to light and on accommodation. Vision was noticed to be defective on the day following the storm; if she closed her right eye she felt as if she was looking through a piece of muslin with her left eye. After her left eye became affected she noticed that the vision of her right eye was also defective; but as she had squinted with this eye in childhood it is probable that the right eye had been always more or less amblyopic. Her hearing, tested by watch, was apparently normal. There had, however, been a discharge from her left ear in babyhood, but it had lasted only for a day or two. She had been studying music closely before the onset of her blindness.

R.V. = $\frac{1}{50}$. L.V. = hand movements close to face.

Ophthalmoscopic examination of the right eye showed hypermetropia of 5D.; of the left eye hypermetropia of 3D., with the appearance of connective tissue proliferation over the disc; beyond a tendency to striation of the retina the fundus otherwise appeared healthy. The ophthalmometer showed 5D. of oblique astigmatism in the left eye.

With +3D. the right eye had $V.=5/_{40}$, while the left eye showed no improvement with lenses.

Treatment consisted of rest to the eyes, dark glasses, a saline douche, and a mixture, internally, containing sodium iodide and strychnine.

13th August, 1906. There was a distinct improvement noted in both eyes. $R.V.=3/_{50}$, $L.V.=1/_{50}$. When the left eye was rotated there was less pain felt than on the first visit. The visual fields for white were not contracted. Colour perception of the left eye was affected, but not of the right eye. There had been no headaches and no vomiting at any time.

O.E.R. Disc clearly defined. O.E.L. Disc blurred in outline like papillitis and veins rather engorged, an appearance quite distinct from that on the former visit.

Patient was said by her mother to be cheerier and brighter, she had been wearing dark glasses, and going out driving and walking.

There was given at this date a past history of an alveolar abscess on the left side, which had to be incised, but this had occurred more than three years ago and she had had no trouble from it since. There was no definite history of rheumatism.

The urine was examined and found to be free from albumen and sugar.

25th August, 1906. A distinct improvement was again noted in both eyes.

$R.V.=4/_{50}$, $L.V.=1.5/_{50}$. Evidently, from the improvement noted, both eyes have been affected. Patient was both hopeful and brighter.

O.E.L. showed merely slight haziness in outline of the disc, up and in. There was now no pain on rotation of the eyes.

Central colour perception with the right eye for red, green, and blue was correct, but with the left eye the colours were not recognised.

8th September, 1906. R.V.= $\frac{4}{50}$, L.V.= $\frac{5}{20}$, a marked improvement.

8th Oct., 1906. With correction, R.V.= $\frac{5}{30}$, L.V.= $\frac{5}{5}$.

O.E. showed left nerve head to be quite clear with distinct outline.

25th July, 1907. Colour vision with the left eye for red, green, blue, and yellow was found to be quite normal. The right eye was as at last visit, that is, as it had been, presumably, previous to the lightning episode.

REVIEWS.

J. H. PARSONS. **Diseases of the Eye.** London: J. and A. Churchill, 1907.

“WHAT! another book on diseases of the eye!” is the natural exclamation on taking up this short treatise by Parsons, and in his preface the author acknowledges that he has to issue an apologia for its appearance. In it he gives an outline of four chief objects which he has steadily kept in view. These are (more briefly than he puts them) first, to work the student along from normal anatomy and physiology to morbid; second, to describe more thoroughly than is usual the fundamental optical principles; third, to restrict himself to the commoner diseases; and fourth, to describe only “well-established methods of treatment.” The author’s definition of these last proves on examination to be the methods which he himself follows,—other plans are in his view “of questionable value.” He to some extent disarms this criticism, it must fairly be admitted, by the perfectly just contention that it is better in a work of this didactic nature to be definite or even dogmatic than to confuse the reader with a multiplicity of methods. He disapproves of coloured illustrations of external diseases because he considers that it is far better that the student should see the actual

patient at the clinique which he attends, and we agree with him, but one cannot avoid noting in this connection that while some of his black and white diagrams are very good, others are so indistinct as to be incapable of teaching anything. This is particularly true of Nos. 109, 130, 145 and 149. On the other hand, most of the coloured diagrams of the fundus are very good indeed, being both true to life and instructive: Nos. VII. and IX. are, however, serious exceptions to this rule.

The book opens with a brief account of the anatomy and physiology of the region, then follows a section of eighty pages dealing with the examination of the eye, very well written; the last section is taken up with diseases; three appendices are occupied respectively with "preliminary examination," a pharmacopœia, and the rules as to the amount of vision required for the various services.

There are some minor matters for which we think the author deserves special praise; in omitting from his book, for example, the confused and needless terms *nyctalopia* and *hemeralopia*, since these are employed by different writers in totally antagonistic senses; in protesting against regarding the expression $\frac{6}{6}$ as a vulgar fraction to be considered as equivalent to 1; in insisting on the great value of routine methods in examination with the ophthalmoscope, for every teacher must have seen the pathological condition missed over and over again by students and others merely from neglect of this. But there are other points to which we must call attention in which the language of praise cannot be used. For example, the author states (p. 169) that the peculiar shape of the field is due to the interference caused by the nose and brows; closer investigation would convince him that this is only a half-truth. "Concomitant strabismus always commences in childhood, generally in early infancy" (p. 551) is a statement requiring revision. Several assertions in regard to the necessity for bandaging, smoked glasses, tying down the hands of patients and keeping them in bed suggest strongly that the author has merely followed a blind routine, and has not brought either enquiry or experience to bear on the points. Speaking of iritis, he suggests (p. 289) that if doubt as to the diagnosis exists as between iritis and glaucoma, a drop of homatropin solution may be instilled, when the difficulty will be cleared up! We confess to the view that such a procedure would run perilously close to the line of malpraxis. In regard to glaucoma, he makes no mention of the peculiar scotoma which has been

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shown to exist with frequency and to form a really valuable clinical test; he states too, and repeatedly, that in glaucoma the pupil is frequently oval with the long axis *vertical*!

But we have no desire to "pick holes" in what we recognise to be, for its size, one of the best existing text-books on the subject of diseases of the eye. It is written in a pleasant, instructive, elegant style, with some attention to literary grace—alas, so often conspicuously absent in medical books. The reader will find it, however, to be decidedly stronger on the scientific than on the clinical side; to give illustration—the author does not seem to think of mentioning to what extent vision is affected by various diseases,—for example, tobacco amblyopia and albuminuric retinitis; yet it is just in such matters that the inexperienced are apt to arrive at false conclusions or to be altogether at sea. The index is not sufficiently copious. Thus, we wished to look up hereditary optic atrophy, but on turning to the index we could find no direct reference to this important affection under "Hereditary," "Optic" (although "Optic Neuritis" is there), "Atrophy," "Leber" or "Nerve." We wish to raise a protest too against what we think an improper custom exemplified in this book. When a diagram of an instrument is to be introduced there is no occasion for making the illustration the vehicle of a gratuitous advertisement for a particular instrument maker; the name ought to be suppressed and not blazoned forth as has been done in this and many other books. It is apt to suggest unpleasant possibilities, and is not at all fair to other manufacturers who may be equally skilful.

W. STOCK (Freiburg). **Tuberculosis as a Cause of Chronic Inflammations of the Eye and its Appendages, especially of Chronic Uveitis.** *v. Graefe's Archiv für Ophthalmologie*, lxi., 1.

AMONG the various causes of chronic inflammation in the eye tuberculosis is one that has come into prominence in recent years, but while its presence has often been suspected it is seldom that the clinical appearances, either in the eye or in other organs of the body, have been sufficiently definite to render a positive diagnosis and therefore specific treatment possible.

In approaching this difficult question Stock set himself to inquire into the changes in the eye that it was possible to

produce experimentally with tubercle bacilli by way of the circulation, and from a comparison of these changes with those found in human eyes he has attempted to determine how far tuberculosis is the causal factor in chronic inflammation of the uveal tract in man. The results of investigations extending over five years are embodied in this lengthy communication.

Pure cultures of tubercle bacilli were injected into the circulation of rabbits by way of the auricular vein, as a result of which changes were produced in their eyes that were in many respects similar to the chronic uveitis found in man, viz., iritis with the formation of nodules, cyclitis and disseminated choroiditis. The microscopic appearances found in these conditions were not typical of tuberculosis, but the presence of the bacilli in the nodules (though generally very few in number and difficult to find) proved that these changes were of a truly tubercular character. The iritis thus produced, it was found, had a strong tendency to disappear, the nodules clearing up without leaving a trace behind, a result contrasting markedly with that of introducing a piece of affected iris from one animal into the anterior chamber of another, when a severe and destructive tubercular inflammation ensued; the favourable course following the author's method of infection he considers to be attributable to the influence of the blood on the bacilli, and this diminution of the virulence of the bacilli during their passage along the blood-stream, he believes, constitutes the true basis of so-called "attenuated" tuberculosis.

As regards the patches of choroiditis also, Stock found that many of them cleared up entirely; others formed small cicatrices to which the retina, degenerated at these points, became adherent. Others again showed a tendency to progression, and these were mostly situated in the outer layers of the choroid between the equator and ciliary body; the process tended to involve the adjacent sclerotic, leading to thinning and bulging of the latter or even to perforation, in which case the tuberculosis appeared clinically under the form of episcleritis (sulzige skleritis) or of sclerosing keratitis.

Besides these affections of the sclerotic he obtained in one case a caseating nodule in the conjunctiva, and in the tarsus of the lid a small tubercular swelling which clinically resembled a chalazion.

In endeavouring to determine the frequency of tuberculosis

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as a cause of those cases of chronic irido-cyclitis and choroiditis in human patients in whom there was perhaps no positive evidence of tubercle elsewhere or of any other definite cause—the cases of conglomerate tubercle as being clinically recognisable were left out of account—Stock tried the implantation of a small piece of iris that had been removed by iridectomy from such a case, into the anterior chamber of an animal. This was done in 15 cases, but without success. He also injected the aqueous fluid of such cases into animals without any positive result. He examined microscopically eight cases of old irido-cyclitis with commencing shrinking or secondary glaucoma, and among these found definite tubercular changes in one, and in other three cases changes that were probably due to the same cause,—although in none of them did he find any bacilli. But as iridectomy and microscopic examination are not always practicable Stock finds in the injection of tuberculin (T.v.) a most useful help to diagnosis. He employed this test in 76 cases of chronic inflammation of the uveal tract where no diagnosis was possible clinically, and out of these 45 gave a typical general reaction; of these latter cases seven also showed a “local” change in the eye itself.

While the opinions of various writers have differed about the significance of the nodules in chronic “nodular” iritis, especially when situated in the ligamentum pectinatum, as a sign of tuberculosis, it is clear that their presence is not in itself characteristic of this disease. Yet on examining cases of chronic iritis (in man) with the binocular loupe—a proceeding which he strongly advises should be carried out systematically and repeatedly—he could make out in certain cases very tiny nodules with a grey surface in the pupillary zone of the iris, frequently at the margin of the pupil, and these he found were present in the cases which yielded a general reaction from the injection of tuberculin, but in no others. These nodules differ from syphilitic eruptions of the iris by their grey surface (the latter being reddish-brown) and by the fact that they may set up no irritation in the eye while the syphilitic papules are always accompanied by peri-corneal injection. Stock holds that the mere position of the nodules in the iris gives no basis of differential diagnosis between lues and tuberculosis, but he draws particular attention to the occurrence of these tiny grey nodules, which he considers in a measure pathognomonic of tubercle when a positive reaction, either general or local, has been obtained with tuberculin.

Of six cases of scleritis or sclerosing keratitis of obscure origin, which were tested with tuberculin, three gave a positive reaction, but a consideration of similar cases recorded in literature fails to throw any light on their real etiology. The results of his experiments in this direction, however, evidently lead him to think that annular scleritis (to use the name suggested for *sulzige skleritis*) may quite possibly be secondary to a lesion of the choroid or ciliary body that lies so far forward as to escape detection with the ophthalmoscope and only reveals its presence when it extends outwards to the surface; others, on the contrary, consider the affection of the choroid secondary to the scleritis.

The author has carried out the treatment of a few cases of chronic irido-cyclitis and choroiditis, diagnosed as tubercular, with tuberculin T.R. with great success (apparently without making any estimations of the opsonic index), and warmly recommends this as by far the best and surest means of treating tubercular uveitis at our disposal.

THOS. SNOWBALL.

MAGGI (Pisa). The Treatment of Hypopion Keratitis by Sub-conjunctival Injections. *Annali di Ottalmologia*, April, 1907.

DURING the past ten years a great deal of work has been done, both clinical and experimental, on the treatment of hypopion keratitis and other inflammatory affections of the cornea and iris by sub-conjunctival injections, not, however, with uniform results, for while some investigators have laid claim to the most beneficial results, others have met with no success with this method of treatment. Darier first used corrosive sublimate (in a strength of 1-2,000, which was naturally found far too irritating), and subsequently many other substances have been suggested and tried, including hydrochlorate of quinine, normal saline solution, etc.

In view of the diversity of opinion as to the efficacy of sub-conjunctival injections in hypopion keratitis, Maggi practised this method of treatment in a series of cases, using these three solutions in the following strength: Hydrochlorate of quinine, 1-400; corrosive sublimate, 1-5,000; and sodium chloride, 0.75 per cent. The fallacy of the author's *post hoc* argument is at once manifested, as he states that besides the sub-conjunctival injections he continued the usual diurnal application of atropine, iodoform, bandaging and boric lotion.

Quinine injections were employed in fifteen cases, in three of which cauterisation of the ulcer was found necessary, and in two of these Saemisch's section had subsequently to be performed. In the ten cases of sublimate injections paracentesis was required in one case, in one Saemisch's section was performed, and in four others the cautery was applied. In all the six cases in which normal saline solution was injected Saemisch's section had to be resorted to. The immediate result of the injection was a certain amount of pain accompanied by congestion and œdema, which had to a great extent diminished by the next day in the case of the quinine and saline solutions; with the sublimate injections, however, the symptoms of irritation were very marked, and lasted several days.

The beneficial result from the quinine injection Maggi ascribes to its negative chemotaxic property, while the poor results from the injection of sublimate solution, and especially of normal saline solution, he puts down to their positive chemotaxic action. In simpler language one can say that the latter solutions were more irritating to the tissues than the former. The best results are therefore to be obtained, according to the author, by the use of the quinine injections.

It is a well-established principle in surgery to attack the *fons et origo mali*, and in doing so not to impair the vitality of the surrounding tissues. That being so, it is difficult to comprehend the rationale of sub-conjunctival injections in hypopion keratitis. In this condition the infective focus lies in the centre of the cornea, and from there toxins are liberated which call forth chemotaxis, manifested clinically in the hypopion and other signs of irritation.

To inject irritating substances into the sub-conjunctival tissue can only add to the existing irritation of the eye, for the antiseptic solutions to reach the source of irritation must do so by traversing tissue whose vitality they damage in their transit. No surgeon would treat an appendicular abscess by sub- or intra-peritoneal injections of antiseptic fluids, and yet the peritoneum is much more tolerant of irritants and toxins than the eye as a whole, and the iris in particular.

The whole theory of antiseptic sub-conjunctival injections for the treatment of hypopion keratitis rests on a wrong interpretation of the pathological facts, and therefore can not be anything but harmful in its application.

THOMSON HENDERSON.

PURTSCHER (Klagenfurt). **Note on a Little Known Form of Complicated Cataract.** *Archives d'Ophthalmologie*, April, 1907.

THE form of cataract to which attention is drawn in this paper is not generally noticed in the literature on the subject of diseases of the lens. In fact Dr. Purtscher has only come across one communication bearing on the subject, and unfortunately he has mislaid the reference. He submits details of four cases—two brothers, their sister and a man who was no relation. In all the cases the cataracts appeared about the age of thirty; they were either cortical or more commonly total; the sclerotic was thin and of a porcelain bluish white; the anterior chamber was very deep; the iris was of a dirty grey-brown colour, and showed none of the usual trabecular structure, though sometimes concentric folds were visible; a very irregular ectropion of the uvea was usually present; the pupils were sometimes contracted, generally unequal, acting badly to light, to accommodation and to atropine. Iridodonesis was marked in most of the eyes, and the vitreous was often so fluid as to escape with aqueous when the anterior chamber was opened. In all the cases there was a strong predisposition of the eyes to glaucoma, cyclitis and detachment of the retina on any operative interference.

If operative intervention is absolutely necessary probably a preparatory iridectomy followed by extraction of the lens by means of a spoon or hook offers the best chance of a successful result.

FRANK C. CRAWLEY.

COSMETTATOS (Athens). **Epithelial Cysts of the Conjunctiva.** *Archives d'Ophthalmologie*, April, 1907

HAVING discussed the various classifications of conjunctival cysts, and having come to the conclusion that a classification founded on their structure is the most rational, Cosmettatos gives details of two cases. These were epithelial cysts, of which there are three varieties—those developing in the glands of Krause, or from the so-called glands of Henle, or from abnormal folds of the conjunctival epithelium after an inflammation of that membrane. The two cases he reports belong to the latter variety. The first case showed symmetrical cysts developed at the inner canthus of each eye and having

no immediate connection with any adjacent structure. They were composed of cylindrical epithelium with goblet cells and a layer of conjunctiva surrounding the cavity of the cyst. The second case presented a cyst at the inner canthus of the right eye outside and below the semilunar fold. Its wall was covered by a cylindrical or flat epithelium, and all round the cavity there was a thick layer of conjunctival tissue. At one point there was a fold in the conjunctiva, covering a part of the cyst, the bottom of which nearly reached the cyst wall. In both cases a chronic conjunctivitis was present.

The cysts due to implication of Krause's glands occur at the fornices, upper and lower; those from Henle's pseudo-glands on the palpebral conjunctiva.

In both of Cosmettatos' cases the cysts were easily extirpated under local anæsthesia.

FRANK C. CRAWLEY.

PASCHEFF (Sofia). **Spring Catarrh.** *Archives d'Ophthalmologie*, March, 1907.

THIS is a clinical and pathological study of spring catarrh based on 93 cases and illustrated by micro-photographs. Similar findings and conclusions have been recorded by previous writers, but the paper brings out one or two points. In the clinical section Pascheff draws attention to the sleepy look of many patients suffering from spring catarrh, an appearance due to drooping of the affected upper eyelid. He points out once more, as several other observers have done, the frequent association of the disease with the "lymph-adenoid" diathesis, as revealed by hypertrophic rhinitis, enlarged tonsils, adenoids, etc. As evidence of the extreme chronicity of the disease, Pascheff has seen the circum-corneal thickenings persist for fifteen years, and the characteristic "pavement" condition of the upper lid for as long as nineteen years. He found that excision of the thickened masses was the best treatment in these obstinate cases.

The pathological changes are described in great detail, but the salient conclusion arrived at is that the primary and most important changes take place in and around the blood-vessels. Following on the thickening and proliferation of the vascular walls come œdema and leucocyte infiltration, resulting eventually in fibrous tissue formation which in the later stages is the predominant factor. This fibrous tissue is infiltrated by

cells of various types, the most numerous being plasm cells. Mast cells (Ehrlich), and polynuclear leucocytes are also fairly abundant. Pascheff, in common with other observers, regards the changes in the epithelium as secondary.

W. W. SINCLAIR.

CASEY A. WOOD (Chicago). **The Eyes and Eyesight of Birds.**
Ophthalmology, April, 1907.

THE study of the eyes, and particularly of the ophthalmoscopic appearances of the fundus, of birds has not hitherto been carried out very systematically, and one is therefore prepared to welcome Casey Wood's contribution to our knowledge of these matters. He has been at great pains to examine, along with Mr. Head, a large number of birds, especially those in the Zoological Gardens in London. The two observers have used in part the ordinary ophthalmoscope and in part the self-luminous form of the instrument for this purpose. The avian fundus differs greatly in three respects from the human: first, because there are no true retinal vessels; secondly, because of the presence of the pecten; and, thirdly, because in a certain number at any rate there is a second macula. The pecten is a structure, almost confined to aves and reptilia, which arises from the optic disc and thence projects far into the vitreous humour, reaching nearly to the posterior surface of the lens. It is pigmented, corrugated or plicated, erectile, solid or fenestrated, composed of large vascular trunks, smaller vessels and a very little connective-tissue, all bound up together in a fine pigmented membrane. In the nourishment of the retina (and vitreous humour?) it takes the place of a branching system of retinal vessels, these being absent in the avian fundus, and Wood suggests that in addition it may assist the action of accommodation, as when suddenly filled with blood it may, "by a sort of hydraulic pressure," push forward the lens, this being free to return to its former place when the pecten is again emptied. This does not, one must confess, seem a very probable arrangement; one would require to have a little proof before one could be expected to accept this theory. Would not this sudden engorgement for the purpose of the pecten being transformed into a hydraulic ram militate somewhat against its more important function in connection with nutrition? It used to be stated that in the kiwi or apteryx the pecten was

absent, but Wood confirms Lindsay Johnson's statement that in this respect at least that singular creature is not a solitary exception to all birds, but does actually possess a pecten; of this he gives an illustration by way of proof. The existence of the second macula is a peculiarity which, so far as we know, is shared by the members of no other group.

All birds except those living in confinement are hypermetropic, some very much so, but, as is the case with other creatures, they degenerate under the influence of captivity and in-breeding, and may become nearly emmetropic.

The eye of the average bird is large in relation to the size of the head. the pupil is usually circular, the cornea highly curved and the anterior chamber deep. Probably the chief means of accommodation is the muscle known as Crampton's, though the lens does alter its shape as in man. Crampton's muscle surrounds the globe like a girdle in the neighbourhood of the equator, and by its contraction drives the lens forwards, so shallowing the anterior chamber. The creature can indeed, as Beebe has well expressed it, convert his eye from a microscope into a telescope in a fraction of a second.

Wood's work is one deserving of the highest encouragement, requiring as it did a high degree of skill, an enormous fund of patience, and a large store of knowledge. The diagrams illustrating the fundus in various birds, from the pencil of Mr. Head, are worthy of high praise.

W. G. S.

E. J. O'MEARA (Captain I.M.S.). **Transplantation of the Cornea.** *Indian Medical Gazette*, March, 1907.

THE following method of operation has been found by Captain O'Meara to be of much service in substituting a clear cornea for a leucoma. He has as yet only operated in bad cases, cases in which vision was completely gone and the patient had everything to gain and nothing to lose. He first, under cocain, transfixes the opaque cornea with a Graefe's knife and cuts off a superficial slice of the opaque area; this process he repeats, shaving off more and more, always employing the knife to make the half section after transfixion, then seizing the flap in forceps, drawing on it and cutting it off in the same plane below. As the remaining layers become fewer it is not unusual for vision to improve as he proceeds to shave away the cornea,

but this is not invariable, nor is some success to be despaired of even if there be no better vision than mere perception of light after a good deal of corneal scar tissue has been pared off. Should the aqueous humour begin to rush or drain away, the operation is stopped at once and the eye closed up for a few days, after which the surface must again be freshened.

All being now ready, a dog is rapidly killed with chloroform, three or four sutures of fine silk are passed through its cornea at equal distances round the margin, after the globe has been thoroughly exposed to view, and the cornea is then cut off entire at the corneo-scleral junction. This must be done by means of the knife; scissors ought not to be used; and the section is made as nearly horizontal as may be in order to provide the maximum possible width of raw base. Any small bleeding points in the leucoma being carefully dried, the dog's cornea is now placed in position on the raw surface and secured to the conjunctiva by means of the sutures already introduced into the cornea. It is useful, though not essential, to unite the lids temporarily over the cornea by one or more stitches; a firm bandage is then applied.

One does not gather somehow from his paper that O'Meara is at all enthusiastic about this operation, but he has found it to be of good service in some cases, and as the condition of the patient is absolutely bad, any gain at all is a great advantage to him; the operation is therefore worthy of attention. He notes, further, that patients are often gratified by a decided improvement in the appearance of the eye resulting from the procedure described.

W. G. S.

BOLEY (Hanover). A Case of Perforation of the Caruncle from Blennorrhœa of the Lacrimal Sac. *Wochenschrift für Therapie und Hygiene des Auges*, No. 30, 1907.

BOLEY describes a case the like of which he cannot find recorded. A young girl suffered from slight oœna; later the left eye became swollen, both lids, bulbar and palpebral conjunctiva, particularly the plica and caruncle, were so large and red that identification of their parts was difficult. By pressure over the lacrimal sac some thick yellow matter could be driven from the puncta, and similar pus exuded from the caruncle. He was subsequently able to demonstrate in the caruncle a

crater-like depression which communicated with the lacrimal sac, for fluid syringed into the sac escaped through this opening.

Irrigation with 10 per cent. protargol solution, gentle massage and boric fomentations resulted in a complete cure.

Boley considers that the cause of the trouble must have been an infection of the lacrimal sac from the nose by some virulent micro-organism, and that the acuity of the inflammation was such that the duct and canaliculi were insufficient channels of exit for the pus, which penetrated first the wall of the sac and then the caruncle. A primary abscess of the caruncle and perforation into the lacrimal sac could scarcely provide a satisfactory solution in view of the known nasal disease.

N. BISHOP HARMAN.

G. M. GOULD (Philadelphia, U.S.A.). **Eye-strain from Peculiarities of the Retinal Vessels.** *New York Medical Record*, June, 1907.

As an occasional cause of some of the symptoms grouped under the expression eye-strain Gould regards certain unusual conditions of the retinal vessels. He relates two cases, the first being that of a woman of 46, suffering from typical, if somewhat hysterically exaggerated, symptoms of eye-strain. Careful examination showed the difficulty to be that she could not "hold" the image of the right eye, or see continuously with it,—what Gould calls "fading image." She had had the trouble nearly all her life. Careful correction of refraction gave little help (it had all been carried out again and again!), she never could go on seeing. The ophthalmoscope showed a curious loop in the superior temporal artery of the disc; the artery made a loop, and passing under itself, by which the lower portion was considerably flattened, proceeded to the macula, but much paler and half collapsed. Believing that the asthenopia was due to this interference with proper vascular supply, which could not well be remedied, Gould ordered a blinder to be worn, which was done for a time, and gradually the patient improved. The improvement did not begin at once, nor was this expected, as the right eye was still "struggling to see," but gradually much improvement resulted.

The other patient was a strong young man of good physique, aged 20. He had continual blepharospasm, the lids being

nipped together and held so. His difficulty also was that things faded away, so that indeed he would be almost blind for some few seconds. "Do what he would, he could not use his eyes for constant or near work." Several ophthalmic surgeons had ordered glasses, but the benefit obtained had never been permanent. With the ophthalmoscope it was found that the vessels curled round each other in an extraordinary way on the disc, and more especially the upper temporal artery of the right eye crossed over the corresponding vein once and under it twice. There was noteworthy venous stasis and venous pulsation, the veins being more swollen and turgid near the disc than peripherally. Gould "felt justified in ordering correct lenses, in explaining what I thought the cause of his symptoms, their incurability, and in urging a lifetime renunciation of nearly all reading, writing, or near work occupation." In this case it will be observed that the chief cause was difficulty in the blood return, as compared with the first, in which the blood supply was imperfect. Gould is sure that in an unknown number of cases this vascular difficulty lies at the root of the mischief.

W. G. S.

DRANSART. **Blindness in the North of France.** A Bassée, Douai, 1903.

THIS is a statistical inquiry into the causes of loss of sight, temporary or permanent, in one or both eyes, among the patients attending the author's clinics at Somain and Douai, between the years 1874 and 1902. For the purpose of this investigation all cases in which the vision was reduced below one-tenth were regarded as blind, irrespective of cause and prognosis.

Blindness, thus defined, appears to affect the male and female almost in the ratio of 2:1, because of the greater working risks in the male. Binocular blindness, which is generally diathetic, is pretty equally divided between the two sexes.

About 16 per cent. of all cases occurred between the ages of 0 and 15, 64 per cent. between 15 and 60, and 20 per cent. between 60 and 100 years of age, the highest percentage naturally occurring during the period of greatest working activity.

Cataract caused 15 per cent. of the cases; atrophy of the

optic nerve, 12·5 per cent.; leucoma, keratitis and staphyloma, over 14 per cent.; injuries, 14 per cent.; glaucoma, 8 per cent.; irido-choroiditis, 10 per cent.; myopia and detached retina, 7 per cent.; granulations, 7 per cent.; congenital affections, 3 per cent.; purulent ophthalmia, over 3 per cent.; interstitial keratitis, 3 per cent.; sympathetic ophthalmia, less than 1 per cent. It is obvious that Dransart's figures are not a complete statistic of blindness in the North of France; the incurably blind do not come to the hospitals. They represent rather, as he says, "blindness in a state of evolution"—a field where there is still scope for the activity of the surgeon, either prophylactic or curative.

In the operative treatment of cataract the author employs Daviel's operation, without iridectomy. He performs iridectomy only when occasion arises, *e.g.*, as a preliminary step in cases of synechiæ, at the time of operation when extraction of the lens proves difficult, or after it when prolapse of the iris occurs. He removes cortex by suction and irrigation with distilled water, and to this method of proceeding attributes a relative immunity from secondary cataract. The same operation is employed in cases of immature cataract, for which he considers Förster's operation is unnecessary and not without risk.

The author is of opinion that malnutrition and the arthritic diathesis are responsible for a large number of cases of cataract, errors of refraction also playing their part by producing a *locus minoris resistentiæ*, and believes that careful general and ocular hygiene—the latter standing mainly for appropriate glasses—with anti-arthritic treatment would prevent the development of cataract in a large proportion.

As regards the use of collyria of solution of potassium iodide to which Badal (among others) has attributed a prophylactic and even curative value, his respect for the opinion of that observer has induced him to give them a trial, but he is obliged to confess that the results have been of the smallest.

Attention is drawn to the possibility of cataract following contusion of the eye in six or eight days or less, while detached retina and even atrophy of the optic nerve and simple glaucoma may follow within 5, 12 or 18 months after a comparatively slight injury of the eye. As a prophylactic measure against the development of these complications the author insists on the necessity for the most careful attention to antiseptic details, and the supervision of the eye until the

“perfect re-integration of the visual functions” in all cases of injury of the globe, however slight.

The law of 1898 seems to have diminished the number of accidents in France, owing, as the author thinks, to the greater precautions taken by the employers—a result which hardly seems to accord with our experience of the effect of the Workmen's Compensation Act in England.

Sympathetic ophthalmia, though much less frequent than in pre-antiseptic days, is more frequent than it need be. The number of cases would be reduced by careful antisepsis and prolonged attention to all grades of injuries and the more frequent adoption of preventive enucleation, which the author regards as being unduly out of favour owing to the influence of De Wecker. Preventive enucleation is especially called for in alcoholics and workmen who are not in a position to give the requisite time and rest for the complete restitution of visual functions.

With regard to myopia and detached retina, the author considers that improved school hygiene and general hygiene have had a prophylactic influence, which, however, is more than counterbalanced by increase in amount and intensity of study. He strongly recommends full correction of the myopia by glasses as a means of checking the progress of the malady. For advanced cases the author mentions the following three operative procedures in order of preference:—(1) Iridectomy and sclerotomy (Dransart); (2) extraction of the lens (Fukala); (3) stretching of the peri-orbital nerves (introduced by Badal for the treatment of glaucoma, and applied by Rolland to cases of myopia).

The author has tried most of the ordinary methods of treatment for detached retina, and finds the sub-conjunctival and sub-capsular injections of sodium chloride and sodium phosphate—with or without iridectomy—the most satisfactory.

Glaucoma appears to be somewhat less frequent in the North of France than elsewhere. The author estimates that the number of cases of blindness from this cause could be halved by the timely adoption of operative and therapeutic measures along with accurate correction of errors of refraction. The general treatment of most value is that directed towards the prevention of arterio-sclerosis.

Leucomata and other corneal troubles figure so largely as causes of blindness owing to the frequency of corneal suppuration in children, especially after exanthemata, and in adults

when corneal injuries are complicated by disease of the lacrimal sac. The author finds that a sub-glaucomatous condition often interferes with the healing of corneal ulcers, and in these cases paracentesis or iridectomy is followed by rapid recovery. The use of yeast, anti-streptococcic serum, sub-conjunctival injections of perchloride of mercury, injections of hetol and iodipin and the use of the thermo-cautery are among the most efficient therapeutic measures employed against corneal suppuration. Iridectomy is recommended for the relief of pain and preservation of vision in cases of posterior synechiæ.

Improved general hygiene, especially with regard to housing of the poor, has reduced the number of cases of rheumatic iritis, dietetic treatment has been effectual in diabetic cases, but the public is not yet sufficiently alive to the dangers of syphilis and alcohol, and the author suggests a crusade to enlighten the youth, and especially soldiers, on the subject.

Atrophy of the nerve seems a somewhat hopeless condition to cure, except when due to a peripheral cause, *e.g.*, rheumatic tenonitis. Preventive hygiene is our only hope in most cases, and a more general knowledge and fear of the consequences of syphilis would probably greatly reduce the number of cases.

The reduction of cases of blindness from purulent ophthalmia from 33 per cent. to 9—10 per cent. (Trousseau) and 3—4 per cent. (Dransart) is very satisfactory, but still better results will be obtained if prophylactic measures be thoroughly carried out, such as antiseptic douching of the vagina before labour, bathing of the eyelids and eyes immediately after birth and instillation into the conjunctival sacs of 2 per cent. solution of silver nitrate. The author considers the latter unnecessary if the other precautions are carefully carried out. Should ophthalmia supervene the case should be taken at once to an ophthalmic surgeon for cauterisation of the conjunctiva once or twice daily (Abadie's method). By these means, applied within the first few days, a cure is absolutely certain. Other methods of treatment the author finds less satisfactory.

Blindness from granulations of the conjunctiva, though estimated at 5 per cent. to 8 per cent., owing to the high percentage during the decade 1876—1886, is now only about 0·50 per cent., thanks to the improved hygiene and municipal clinics and restrictions. Dransart has tried all the usual methods of treatment, but finds the combination of superficial *brossage* with various medicaments, such as copper sulphate, boric acid, perchloride of mercury, and the sub-conjunctival

and intra-tarsal injection of solutions of bactericidal substances, especially of perchloride of mercury, gives brilliant results, *i.e.*, a cure within five or six weeks.

Except for congenital cataract and certain cases of amblyopia the curative treatment of blindness due to congenital affections is practically nil. Preventive treatment should be directed to avoidance of traumatism and moral emotions in the mother and of syphilis and alcoholism among progenitors. By these means the author estimates that the number of cases could be reduced by one-third.

Taken altogether, Dransart estimates that 50 per cent. of cases of monocular and binocular blindness are curable and that by the adoption of preventive social and general hygienic methods and the most recent scientific methods of treatment this number should be increased to 80 per cent. at least—the remaining 20 per cent. being irremediably blind.

J. JAMESON EVANS.

MADDOX (Bournemouth). **The Clinical Use of Prisms.** 5th Edition. Bristol: John Wright and Co. London: Simpkin and Co., 1907.

THIS highly useful little book has now reached its fifth edition, eighteen years after its first appearance. In this new issue there have been placed an account of some new instruments, the prism-verger, the duant, and the spirit-level prismeter, as well as a means of measuring hyperphoria in near vision. The other names explain themselves, but the duant may not; it is an instrument for measuring the inter-pupillary distance. The prism-verger was first described in this journal a few months ago.

At the end of the book there is placed a "workman's page," explaining to the actual manufacturer how to resolve the different methods of prism-nomenclature, etc. In connection with that matter Maddox proposes the measurement of prisms by "centunes." Thus, as he explains, a 2 per cent. prism would mean one which deflects light two centimetres per metre. If necessary for very fine adjustments the term may be qualified, —arc-centune or tangent-centune. He considers this method, which certainly presents some advantages, superior to either centrad or prism-dioptre.

The book is written in the author's usual clear, illuminating style, with that peculiar quality of freshness which he manages to infuse into all his work.

C. A. WOOD. "Eye" in Practical Medicine Series. Chicago: Year Book Publisher, 1907.

THE Practical Medicine Series consists of ten volumes dealing with the year's (1906) progress in Medicine and Surgery; the "Eye, Ear, Nose and Throat" form Volume 3. The part of the volume dealing with the Eye is all for which we can speak, but of it we may say simply that it is done in a manner worthy of the compiler, Dr. Casey Wood, whose work in different departments of ophthalmology is well known. Current literature has been ransacked, and all the new papers of any value seem to have been examined and noted. Some of these same papers are no doubt of merely ephemeral value, but it is never safe to prophesy, and we owe a debt to Dr. Wood for so conveniently bringing them together. The British agents for the publication are Gillies and Co., Glasgow.

CLINICAL NOTE.

SECONDARY CATARACT.—Lubowski warmly recommends a method of discussion which he has employed for the last two years. At the outer side of the cornea, about 1 mm. within its margin, he makes a puncture with a small keratome, he then introduces a perfectly sharp cystitome or Stilling's harpoon, and sinking its point into the membrane at the opposite side of the pupil draws it back, deliberately and without pressure, to the aperture of entrance, thus making a horizontal cut, which usually gapes widely. After it has been ascertained that no vitreous threads are entrapped in the wound, a dusting of iodoform and a bandage complete the operation. The author says that on the following day the eye will be found quiet and the wound firmly closed; the dressing may be dispensed with, and the visual acuity ascertained. It is not necessary to take the patient into the hospital. The method is applicable not only to thin, but also to fairly stout membranes; it is not suitable for tough, adherent, complicated cases.—*Klinische Monatsblätter für Augenheilkunde*, April, 1907.

NOTES ON A CASE OF EPISCLERITIS PERIODICA FUGAX.

By EDWIN TEMPLE SMITH, M.B., M.R.C.S.,

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DURING a decade of general practice and some nine months of work in the ophthalmic department of a large English Hospital, the writer has seen a few cases of scleritis and episcleritis, but only one of the condition known as *episcleritis periodica fugax*. It is probably uncommon. Swanzy¹ does not mention it as a separate entity. Hansell and Sweet² say that the symptoms and signs of the fugacious form are those of episcleritis, viz., a swelling round or oval in shape, localised, violet in colour, tender to the touch, and accompanied by œdema of the adjacent conjunctiva, and that this form is entitled to separate notice only on account of its peculiarity of incidence.

It is only on reference to Fuchs³ that one finds anything like an accurate description of *episcleritis periodica fugax*. He regards it as identical with the subconjunctivitis of von Graefe. His description fits the writer's case fairly well except that the latter showed no œdematous swelling of the episcleral tissue and conjunctiva, and the absence of this was not to be explained by any lack of severity for the attacks were all exceedingly severe. Moreover Fuchs says that the inflammation is often partial, in that it is confined to one portion of the anterior segment of the eyeball. In the present case it was always partial. Fuchs describes the affection as rare, and this is the writer's excuse for the publication of the following notes. He had the opportunity of watching the onset and recovery of the malady during five attacks, in a man who has been under close

personal observation for five years, and a capable artist was at hand.

An attack begins in this way. The patient notices some haziness in the sight of one eye, and finds, on examination, that the pupil of this eye is rather smaller than that of the other. This phenomenon sometimes occurs a day or more prior to any other symptom. The pupil reacts to light and accommodation, but is perhaps a trifle sluggish. The iris is not discoloured, nor are the media disturbed, nor is the tension altered. These conditions obtain throughout the attack.

The next thing noticed—after one or two days—is the presence of one or two engorged and purplish scleral vessels (fig. 1), with perhaps a slight salmon-coloured blush of the conjunctiva in the neighbourhood. Coincidentally with this, a tender spot developes in the centre of this disturbed area. It is tender to pressure with the finger, and even to that caused by the lids on contraction of the orbicularis. But, so far, there is no pain.

Next day, perhaps, the eye is painful as a whole, and there are neuralgic pains in the side of the head, just as in iritis. The pain comes on in paroxysms, and is very severe. At the same time the vision is impaired. The eyeball at the affected spot has become exquisitely tender. The affected part of the sclera and the overlying conjunctiva are intensely injected, and get more so every day, for three or four days to a week, when the injection begins to subside. At its acme, the colour is almost that of raw beef, but of a somewhat violet hue, due to the engorgement of the scleral vessels. There is at no time the slightest swelling, either discrete or diffuse, nothing resembling a node, and no sign of œdema.

This inflammatory state is restricted to about a quarter

or a third of the anterior segment of the eyeball, and may appear at almost any part. On one occasion (Fig. 2) the injection occupied fully half the sclera. The remainder of the eye is remarkably pale by contrast. When the disease is at its worst, for perhaps a day or so, the whole conjunctiva becomes more or less injected, though the deep scleral vessels are involved only in the one small region, and the conjunctival engorgement is much more intense in that neighbourhood. The ciliary congestion differs from that met with in iritis by being localised to the one area.

The average duration of confinement to the house, in the five attacks, was sixteen days; the period of disability varied from seven to twenty-eight days. When at the worst, the patient had to be kept in a darkened room, with the affected eye covered in wool, as he found warmth essential. He also insisted on the eye being tied up with a *black* silk handkerchief, as the least vestige of light caused pain. There was never any additional pain on movement of the eye, the question of involvement of the insertion of tendons or of the capsule of Tenon being thereby excluded.

In the first attack seen by the writer, although there was no discolouration of the iris, and the ciliary congestion was not altogether suggestive of iritis, the contracted pupil and the intense neuralgic pain led him to instil atropine as a tentative measure. The pupil dilated freely, but the pain seemed increased. Believing then that there was ciliary congestion, without implication of the iris, he used eserine with the idea of depleting the ciliary body at the expense of the iris. This seemed to relieve the pain for a day or two, but it then began again, and all local drugging was stopped. Drugs, in spite of theoretical indications,

appeared to be mischievous, and judging by the behaviour of the eye in subsequent attacks, it seemed probable that the persistent extreme pain suffered during the first one was aggravated by their use. Since then, a policy of masterly inactivity, as regards topical instillations, has been pursued.

The pain is paroxysmal and very severe. The only relief the patient gets while the pain is present is from the application of dry heat in the form of bags of hot salt. It may last for hours if not allayed by the hot applications. When relieved, it may remain absent for some hours, if the patient keep in the dark and perfectly quiet. This stage lasts generally three or four days. In one attack, the first, after several days of improvement, an exacerbation took place, and several more days of pain ensued. The smallest dose of morphia caused such gastric disturbance and malaise, that the patient would bear any pain rather than have it again. Antikamnia at times gave some relief. Salicylate of soda, salicin, salophen, aspirin and the alkalies were all tried in full doses, but without any perceptible influence on the pain or the progress of the inflammation. The only drug from which benefit seemed to be derived was quinine—the salicylate or the sulphate. One would hesitate to say that it had much influence on the attacks themselves, though these were certainly shorter after than before its use, but it seemed to have a favourable influence by way of prevention and in aborting threatened attacks. For instance, the second attack occurred three months after the first; the third, four months after the second. The patient then began taking daily doses of fifteen grains of salicylate of quinine. He now had no attack for over twelve months. Many times during that year he had premonitory signs, but always, by increasing



Fig. 1. Left eye : Fifth attack. Appearance of eye on 2nd day.



Fig. 2. Left eye : Fifth attack. Appearance of eye on 4th day.

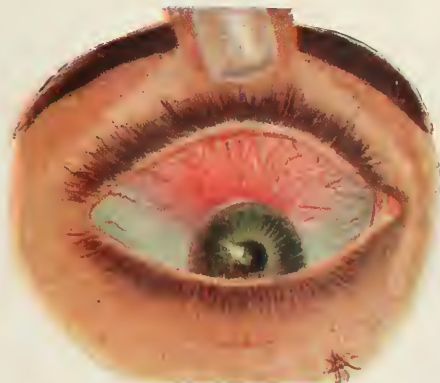


Fig. 3. Right eye : Fourth attack. Appearance of eye on 4th day.

the dose of quinine, the attack was aborted. At the end of a year he began to leave off the drug, only taking an occasional dose, and at the end of sixteen months he had his fourth attack. During this year too—in which he was consuming large quantities of quinine,—he was almost entirely free from the toxæmic headaches from which he formerly suffered. His own impression was that the drug was invaluable and undoubtedly kept him in health. One's own observations tended to confirm that impression. The fifth attack occurred three months after the fourth, and was almost as severe as the first, though it only lasted fourteen days. Figure 1 shows the eye on the second day of this fifth attack. Figure 2 shows the same eye on the fourth day. At the end of a fortnight from the first sign, this eye was normal again in appearance. Figure 3 shows the other eye, during the fourth attack, taken about the third day.

The incidence in the different attacks was as follows:—The first, left eye, upper outer quadrant affected, confined 28 days; the second, right eye, upper outer quadrant, confined 21 days; the third, right eye, lower inner quadrant, confined 10 days; the fourth (Fig. 3), right eye, upper quadrant, confined 7 days; the fifth (Fig. 2), left eye, lower quadrant, confined 14 days. This gives an average confinement of 16 days every 4 months, during a period of 2 years.

After the eye has regained its normal appearance, which, after a variable period, occurs rapidly, the contraction of the pupil, spasm of the ciliary muscle and dimness of vision (temporary myopia, Fuchs) remain for perhaps a week longer. There is no permanent blue discolouration, such as occurs in episcleritis and scleritis proper. In fact nothing is left to show that the eye has ever been affected.

History. The patient, an engineer, aged 35, was born in the fen country in England. His father, who used alcohol somewhat freely, and suffered from rheumatism, died at the age of 40. The mother is still alive and has good health. One brother had rheumatic fever when a boy, and subsequently contracted gonorrhœa, which was followed by arthritis and iritis. He has had recurrent attacks of iritis several times a year for many years past. There are besides another brother and a sister, both of whom are healthy; none dead.

The patient had measles and scarlatina as a child. When 19, he got gonorrhœa, which lasted six months. During its course he was in bed for a week with gonorrhœal inflammation of one ankle joint. He then came to Australia, and at the age of 22 had gonorrhœal urethritis again. He was in the bush, and did not receive adequate treatment. He was given a catheter to use himself, with which he made his bladder septic. He was more or less ill during 18 months, and at the end of that time was taken into town, and found to be suffering from cystitis and septic nephritis. When he recovered, he went on a sea voyage and regained his health.

At the age of 26, the urethral discharge appeared again. He does not know whether it was freshly acquired or not. About the same time he had a severe attack of iritis (so he says) which lasted 2 months. A few months later an attack of cystitis came on, also a urethral discharge. At the same time there was a general infection of the joints and he was six weeks in bed. His shoulders, elbows, wrists, finger-joints, knees and ankles were affected. He was carried from bed to the boat, and sent to New Zealand to the hot springs. In six weeks he was well.

He now had a period of six or seven years of fair health.

Formerly he used alcohol, though not to excess, but for the last 3 years has been practically a total abstainer. For the last $5\frac{1}{2}$ years he has been under the writer's close observation. . During the whole of that time, which is synchronous with his residence in the tropics, he has had periodical attacks of headache. These were dull and heavy in character, and general in distribution. Three years before the first attack of episcleritis he applied for treatment on their account. At this time his heart, lungs, and kidneys were found to be normal. He was emmetropic, his media clear, and optic discs normal. There were no signs of the former iritis and he could not remember which eye had been affected. The pupils were equal and reacted normally. The knee jerks were apparently absent on most occasions, but a feeble contraction of the quadriceps was once obtained; this state of affairs as regards the tendon reflex is still present. His tongue was furred at the back and his complexion was sallow; at one time there was definite jaundice. His temperature was sometimes 100° in the afternoon. The blood count showed moderate hyperleucocytosis.

In a process of exclusion, a diagnosis of possible hepatic abscess was considered, but this did not receive any confirmation by continued observation. On a vague diagnosis of "liver congestion," chloride of ammonium was given in large doses, with excellent results as regards the headache and malaise. He then went South for a trip, and at once improved all round. On his return, he again got the occasional bouts of headache, and what he called "liver," and always dosed himself with ammonium chloride, with benefit for the time being. He was at this time living a most abstemious careful life, but heat always seemed to affect him prejudicially. So he continued till about two years ago, when he had the first attack of episcleritis.

As to the exciting cause of the attacks, the patient was always conscious of a depressed condition of health preceding them; generally he had a dull heavy headache for a few days before. Occasionally the influence of chill was traceable. Whisky always caused redness of one or other eye, and on one occasion a single indulgence in alcohol seemed to have been the direct exciting cause of the attack. During, or before, several of the attacks, he had a twinge of "rheumatism" where the muscles are inserted into the olecranon.

Pathology. The writer believes that the eye disorder in this case was caused by the ultimate product—a toxin—of the gonococcus; that the headaches were toxæmic; and that the "congestion" of the liver was real, and was induced by the action of this toxin on its cells, in their efforts to excrete or neutralize it.

Sir William Gowers,⁴ in speaking of gonorrhœa, says that the organized poison of the disease may induce a subsequent toxæmic state, which is manifested by the arthritis of "gonorrhœal rheumatism." The organisms seem to cause these consequences by producing a chemical organic poison in the blood. This, by analogy with the diphtheritic poison, would seem not to be produced directly by the organisms themselves; but these generate a particular chemical substance, of the nature of a ferment, which acts upon the "albuminoses" of the body, especially in the spleen, and converts them into a poison which has the specific action in question. During periods of bad health, there may be some defect in the chemical constitution of such substances as the albuminoses of the spleen, and this may render the product of such a ferment different from that produced in perfect health. A slight difference in constitution, a little more or less of one element, may

change a toxic substance into a harmless one and *vice versâ*. The organisms of gonorrhœa may in one person and at one time, give rise to a toxic chemical material which acts on the joints, causing the arthritis of "gonorrhœal rheumatism," while in another person, or at another time, it may act on the fibrous tissues of the sclera.

The influence most depressing to this patient was heat. As soon as he went South, to a cooler climate, he put on weight, ate and felt well. On his return to the tropics he invariably lost weight, appetite, and feeling of well-being, and began to complain of his "liver" symptoms.

Sir Joseph Fayrer⁵ says that "exposure to the direct solar heat or to a high temperature in the shade may induce evils of an insidious character by injuring the nervous system, increasing irritability, depressing vital energy and affecting the internal organs, *especially the liver*, which is already over-taxed by eliminating waste products and compensating for the diminished respiratory excretion of carbonic acid through the lungs, the consequence of breathing a more rarefied, and therefore less oxygenated atmosphere. In hot climates the blood becomes deteriorated, and there is a tendency to liver affections."

The patient has now gone to live in a cooler climate, and the writer has felt justified in expressing the opinion that if he keeps his health up to as high a standard as possible, and especially if he avoids the, for him, injurious tropical heat, and that if, on the approach of any temporary depression of health, he takes full doses of quinine, he may reasonably hope to remain free from attacks of episcleritis in the future.

The use of quinine in large doses in this connexion was

brought under the writer's notice by reading, in the *British Medical Journal* of 1905, an account of a general gonococcal infection in which the patient was going from bad to worse until large doses of quinine were used. It appeared to act almost as a specific. In the writer's case also it seemed to have a direct antitoxic effect, and to be of decided value. It was used in massive doses.

The writer's conclusions are :—

1. That episcleritis periodica fugax may exist in a severe form without any exudation of serum or round cells into the sclera, or overlying tissue.
2. That a period of depressed general health precedes the attack.
3. That the affection may be para-gonorrhœal (to use an analogy with syphilis) in origin.
4. That in such cases, quinine in full doses is of more service than the so-called anti-rheumatic remedies.
5. That in the way of local treatment, warmth and protection are all that is needed; drugs which act on the pupil being unnecessary and probably harmful.
6. That the disease is not merely a mild and fleeting form of episcleritis, as suggested by many authors, but a distinct affection, whose not least prominent characteristic is that the eye is left after the attack in apparently normal condition, both as regards structure and function.

In conclusion the writer has to express his appreciation of the skill and care displayed by the artist, Miss Gwendoline Johnson, in giving a truthful representation of the condition.

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REVIEWS.

SULZER. Spontaneous Conjunctival Hæmorrhage. *Annales d'Oculistique*, May, 1907.

THIS very unusual case is described as due to a hereditary hæmorrhagic diathesis, differing from that of hæmophilia. The subject was an elderly lady, who was rather reticent, and thus a very deailed family history could not be obtained. Her mother had died at the age of 80, from profuse intestinal hæmorrhage, after having suffered for three years from repeated serious bleedings from the mucous membranes—buccal, nasal, respiratory, urogenital and intestinal—which induced an extreme condition of anæmia. The twin-sister of the patient died at the age of 30 after an exactly similar series of hæmorrhages, which also, with her, lasted over a period of three years.

The patient herself first came under observation in October, 1902. She had had anginal pains in the chest, with radiating pains down the left arm, for the space of fifteen years; the left radial pulse was more feeble, and at the same time slightly more retarded, than the right, but careful examination afforded no explanation of this peculiarity; in addition, she experienced persistent aching over the apex of the heart, which became worse on exertion or at the least access of emotion.

For ten years the patient had been subject to subcutaneous hæmorrhages. These were always preceded by distinct feelings of tingling, itching or smarting, confined to the site of the blue discolouration which subsequently appeared. The ecchymoses varied in size, in some there was only a series of small points, in others there were patches as large as the palm of the hand, whilst others again were of intermediate sizes between these two; the shapes of the patches differed, some being round, others irregular; the skin over them retained its sensibility to touch, indeed this was usually accentuated to the extent of being painful. The hæmorrhages were always spontaneous and most usually occurred in the morning whilst the patient was still in bed. Digitalis checked their occurrence: when this was discontinued the ecchymoses began to recur after an interval of ten days.

Shortly after the appearance of the first of these hæmorrhages

she had violent bleeding from the nose, followed by vesical and intestinal bleeding; four months later she complained of supra-orbital pain on the right side.

The eye, on examination, was found to be perfectly normal, but there were some chalazions in the upper eyelids. One of these was removed from the right upper lid on the morning of October 27th, 1902. At 4 p.m. the patient returned, greatly alarmed by extreme pain in the right ear, and convinced that this ear was filled with blood and was becoming the site of a profuse hæmorrhage. In order to satisfy her that the passage was clear Sulzer washed out the external auditory meatus with warm water; the patient fainted. On the following day the patient had a chalazion removed from the left upper eyelid. Three days later she complained of peculiar sensations in the right eye and slight lacrimation. On everting the upper lid the incision was found to be well healed; the tarsal conjunctiva was injected and somewhat puffy. Considering that there might be some local infection, one drop of a weak solution of silver nitrate was instilled.

Half an hour later, whilst the patient was putting on her veil before the mirror, she turned quickly round showing the whole right side of her face covered with blood. This blood exuded from the palpebral aperture and formed a thick clot on the face. Compression was made over the eye, which was much swollen. Some minutes later it was found that this swelling was caused by a clot of blood lying between the globe of the eye and the eyelids, filling both the upper and lower palpebral fornix. This rapid and firm coagulation of the blood was found to occur on every subsequent recurrence of hæmorrhage. On reversing the upper eyelid the whole mucous surface was found to be oozing blood in a thin layer, the cicatricial site of the evacuated chalazion alone remaining intact. The hæmorrhage ceased after a few minutes longer, but the conjunctiva of the lid remained red and slightly swollen. At midnight there was a recurrence of bleeding. In the course of the following day, November 1st, the patient had eight hæmorrhages from the eye during the daytime and twelve throughout the night; some of these were profuse, others were represented by only a few drops of blood. On each of these occasions the flow of blood was preceded by some mucous flakes gliding over the cornea across the line of vision, and by abundant lacrimation. Of all the measures tried for checking the hæmorrhage it was found that the most satisfactory were

compresses rapidly applied after having been wrung out of hot water at 60°C.

During the occurrence of these hæmorrhages the hands and feet became cold and very blue, and at times the attack terminated by a series of clonic contractions of the arms and legs. The supra-orbital pain on the right side became worse during the hæmorrhagic crises, and the upper eyelid became more sensitive to touch. The patient was carefully examined by a nerve specialist at this time, but no trace of the existence of hysteria was detected.

On November 2nd the late Dr. Parinaud saw the patient in consultation, and was present when one of these hæmorrhages, with its prodromal symptoms, occurred; the peculiar red injection and swelling of the upper palpebral conjunctiva was noted.

On November 3rd there were four small hæmorrhages during the day, and two during the night.

On November 4th there were two hæmorrhages during the day, and at eight o'clock in the evening the patient's face became red and swollen, and a few minutes later there was profuse conjunctival bleeding which persisted until midnight, and could not be checked at all; everything was tried, and neither local compression nor even manual compression of the carotids was of any avail. The patient was collapsed by the extreme anæmia.

The congestions of the head occurred again on the next day, but without being followed by any bleeding. This, however, recurred again on November 6th, and until the 10th there were about five small hæmorrhages each day.

From the 7th November onwards the paroxysmal flushing of the face was distinctly limited to the right side. On the 10th the patient noticed that her pince-nez (+1.25 D) for distance blurred her vision; there was slight spasm of accommodation in both eyes.

From this time the hæmorrhages ceased.

For some days the patient was given sulphate of soda and calomel, with the effect of producing 3-4 copious motions each day, showing that there had been some retention of the contents of the bowel, in spite of the regular daily evacuation.

On November 16th there was a tendency to a slight glaucomatous condition of the right eye, and on the 20th there was, in the same eye, a spasmodic condition of ptosis; and,

whilst the right eyelids were formerly in a state of hyperæsthesia, they are now in a condition of anæsthesia.

The patient showed no evidence of arterial sclerosis, so that the bleeding cannot be explained by that hypothesis. Nor could any support be found for the supposition of hysteria as a causal factor.

One naturally thinks of hæmophilia. In that disease, however, the anomaly is a congenital one, whilst in the present case the peculiar condition now described did not occur until the fiftieth year had been passed. Hæmophilia passes by the female side, which is itself generally exempt, from the father to the grandson; but in the family of this patient the peculiar condition was inherited by the daughter directly from the mother. In hæmophilia, moreover, the bleeding is always caused by traumatism; in this case the bleeding was always spontaneous, while the incisions made for the removal of the chalazions gave rise to nothing more than a slight and natural loss of blood.

KENNETH SCOTT.

JOHN DUNN (Richmond, Virginia, U.S.A.). *The Spinal Eye.*
Archives of Ophthalmology, xxxvi., 3.

UNDER this heading the author first relates three cases, and then discusses their meaning. By the term he means a condition of the eye which to his mind suggests some form of spinal disease, though not one presenting symptoms comparable with those of ordinary lesions of the spinal cord.

The first case is that of a single woman of 42, who suffered from persistent headache on use of the eyes; no lens or lenses gave her sufficient relief. Examination showed a shallow anterior chamber and a contracted pupil, but not a "pin-hole" pupil; tension was normal. The iris had a convex surface as though the lens was bulging, but the inner edge of the convexity was external to the sphincter. Even without further examination he began, from previous acquaintance with such cases, to suspect some spinal trouble, but the patient denied all pain. However, on examination of the dorsal region a slight but distinct curvature was found between the shoulder blades, and there was decided pain on pressure in that situation, the patient then admitting that she had had almost constant pain under the right shoulder blade for several years. Treatment for this spinal trouble was at once begun.

The second case is that of a single woman of 27, very similar in its essentials to that of the previous patient; the aspect of the iris was exactly the same. In this patient also lateral curvature and pain under the shoulder blade were discovered. Although when she stood up the lower end of the right scapula was distant from the centre of the vertebra only one-third as far as the end of the left one was, the patient had not been aware of her curvature, which was thus only discovered in virtue of the eye symptoms.

The third case is that of a single woman of 30, who had been under treatment by various ophthalmic surgeons without any permanent relief. With her again the eyes were exactly as described above, and Dunn at once requested permission to examine the spine; but, somewhat to his chagrin, he failed to discover anything amiss. She had astigmatism, but correction did not help her much; the only thing which gave relief was complete mydriasis and paralysis of accommodation by means of atropin. She used to beg to be allowed to continue the use of it. Removal of a spur from the nasal septum, and of two wisdom teeth, produced no effect, nor did cessation of all use of the eyes, with an outdoor life. Finally, however, an X-ray picture of the spine was taken which showed a thickening of some kind inside the canal, and this both patient and surgeon believed to be the cause of all the trouble.

One is a little at a loss to understand how mere paralysis of accommodation by atropin could relieve the symptoms due to such a lesion; at least no proof from an optical point of view is brought forward that there was any painful spasm of accommodation which atropin might relieve, although this is assumed by the author to exist. His view is that "the objective ocular picture and the subjective symptoms are both the result of chronic disturbance of the cervico-dorsal sympathetics." There was, he adds, marked photophobia in most of his cases; in all save one the pupil was contracted, in which case this "was explained by the fact that there were in the fundus neuro-retinal changes of nephritic origin." This is obviously no explanation, because if spasm of accommodation entails contraction of the pupil the mere presence of changes in the fundus will not influence the question. The peculiar "bowing of the iris forwards, giving the appearance of a bulging lens beneath" is insisted on as a proof of spasm of accommodation, but is this correct?

"It would seem that we have to deal with either partial

paralysis of, or chronic irritation from stretching or pressure upon, the oculo-spinal sympathetic. Probably the latter. The myosis following extirpation of the cervical sympathetic is said to become gradually less marked and may disappear. In the cases under discussion the myosis persists."

It must be plain that the author is quite mixed up about the action of the sympathetic, for if extirpation of it causes miosis, surely irritation of it will be likely to cause the opposite,—indeed it is very well known to every one out of medical long-clothes to do so. Mr. Dunn may or may not be right that in some cases curvature of the spine may be connected with miosis and pain in the eye, but he must revise his knowledge of the physiology of the parts involved before he frames his theory of the causation of the symptoms, and if he wishes us to accept his statement that there is spasm of accommodation he must bring more proof than merely the presence of pain, a small pupil and a shallow anterior chamber.

W. G. S.

JACQUEAU. **Recurring Transitory Blindness.** *Lyon Médicale*, May 12th, 1907.

APART from hysteria, total temporary blindness in one or both eyes is a very rare occurrence. In such cases as have been recorded the attack has usually been of some duration, varying from hours to days, and has only occurred once in the same individual. In the four cases now described by JacquEAU the blindness was always of very short duration, but frequently recurred.

CASE I. A student, aged 22 years, of nervous temperament and with a tubercular family history, had suffered since the age of 12 from marked accommodative asthenopia, notwithstanding accurate correction of his myopic astigmatism. This trouble was allayed by means of rest and atropine, and after a year in the country he had resumed his studies and was apparently progressing favourably, when he suddenly became subject to violent nervous crises, like epileptic fits, except that he did not bite the tongue or pass urine.

After six of these attacks had occurred in the course of two months they completely disappeared, but were followed by crises of blindness. These consisted in sudden and complete loss of vision in both eyes without any warning. The onset

of the blindness was followed by supra-orbital pain and corrugation of the brows. The blindness only lasted one to three minutes. Vision returned rapidly, but not absolutely suddenly, by progressive lightening of the field without any hemiopic symptom. The pain disappeared a few minutes after the restoration of sight. There was not the slightest cerebral obfuscation or any other concomitant phenomenon. These attacks recurred about ten times a day; if an attack occurred in the street he would wait quietly until the sight returned. They were not modified by the administration of potassium bromide, but after lasting for over five months became less frequent and then definitely ceased. There has been no recurrence for four years. Ophthalmoscopic examination during an attack showed absolutely no abnormality, and the pupils reacted briskly to light.

CASE II. A woman aged 44 years, with no hereditary or personal history of interest except that she had globus when 20 years of age, and influenza, rheumatism and albuminuria five years ago. Three months after this she had attacks of blindness in the right eye only. The blindness became absolute in that eye in a few seconds, and was accompanied by a sensation of twitching in the cheek. There was no mental confusion or any other symptom either in the eye or elsewhere. The blindness only lasted one to two minutes, and then vision gradually returned, generally advancing from the upper part of the field, sometimes from the lower part and very rarely from the sides. The sight was normal again in about half an hour, and the patient was none the worse in general health. These attacks recurred at irregular intervals of one to three months. This patient presented no indications of hysteria, or even of nervousness.

CASE III. A man aged 74 years, with arterio-sclerosis, was suddenly taken, two years ago, with absolute loss of vision lasting two or three minutes. No concomitant phenomena. Has had two similar attacks since.

CASE IV. A woman, 25 years of age, has frequent attacks of total blindness lasting a minute or two, with no other symptom. One eye has good vision and normal fundus, but the other has been amblyopic from infancy and shows complete atrophy of the optic nerve.

As to the nature of these cases Jacqueau dismisses the suggestions of hysteria, double hemianopsia and epilepsy, though he admits that in the first case a larval form of

epilepsy might be accepted as a reasonable diagnosis. He is of the opinion that the condition should be classed as a type of ophthalmic migraine. Of the nature of the latter but little is known except that it is agreed that it is of circulatory origin. It can be definitely stated that in these cases at any rate the circulatory trouble was not peripheral, as the author had the opportunity of making careful and frequent ophthalmoscopic examinations in his first case, and evidence of any circulatory disturbance was always wanting.

The prognosis in these cases should be guarded, as, though they are generally benign, cases are on record where these symptoms were followed by death from cerebral tumour or permanent loss of vision from optic neuritis and atrophy.

J. JAMESON EVANS.

R. HILBERT (Sensburg). **Subjective Sensations of Colour produced by Intoxication with Various Substances.** *Klinische Monatsblätter für Augenheilkunde*, May-June, 1907.

SUBJECTIVE sensations of colour are complained of not merely when poisons are introduced from without but occasionally in the course of certain diseases in which the absorption of toxins plays an important part—in tabes, for example, and epilepsy; in the course, further, of some diseases of the nervous apparatus of the eye; after operation for cataract; in consequence of certain infective diseases and other organic ailments. Perhaps the rarest of the causes is the introduction of toxic substances from without. So far as he has been able to discover Hilbert believes the first example recorded to be that of a patient of Patonillet. This writer noticed that persons who had eaten the seeds of hyoscyamus began to see all objects as though they were coloured reddish or even scarlet. It is further known, and numerous cases of the occurrence have been recorded, that patients under treatment with santonin or its compound with sodium may complain of yellow vision. The same symptom has been observed as the result of experimental ingestion of picric acid or trinitrophenol. After taking $\frac{1}{3}$ gramme of this substance the subject began to have symptoms of slight yellow vision in about two minutes, and this lasted for a couple of hours, being at its worst in about half an hour and passing off somewhat slowly. There was no subsequent blue vision or violet

vision. No experiments have been made with toluylendiamin, which, however, has the power of tinting skin and sclerotic of a yellow hue when taken internally, and no definite statement can be made as to whether it also has a similar effect on vision; the same must be said of lactophenin.

Violet vision occurs as a rarity as a result of over-indulgence in hashish (Indian hemp), and of fungus poisoning (the exact botanical species of fungus is uncertain).

Blue vision has been recorded as a result of acute alcoholism, in a case in which the symptom continued for three days, disappearing under (or perhaps one ought rather to say *during*) treatment with protargol.

Red vision has been recently observed by the author in a patient after the instillation of duboisin in the form of drops (0.5 per cent.). Everything appeared to him of a red colour, and this was the case whether the eye into whose conjunctival sac the drug had been instilled were closed or open, a fact which strongly points to the central situation of the "lesion" producing such a symptom. In a case recorded by Hawkes the same red vision was complained of after the use of scopolamine. It is a point of interest thus to note that atropin, duboisin and scopolamine, which all belong to one family of the solanaceæ, and which are allied further in their therapeutic effects and in their chemical constitution, are capable of producing this same toxic effect. In addition, there is at least one case on record of poisoning by tobacco—a plant of the same order—in which the patient complained of seeing everything through orange-reddish clouds, and one of quinine poisoning with a description of vision of red flames.

It is, however, yellow vision of which complaint is most frequently made. Thus xanthopsia was a prominent symptom in a case in which 5 per cent. chromic acid was used to the feet for the cure of hyperidrosis. A large dose of sodium salicylate has produced a similar symptom, and it has been observed in carbonic oxide poisoning in the case of a lad of 16, who saw all objects of a peculiarly bright sulphur yellow. The author saw another case of xanthopsia of very unusual origin, for it was the result of a snake bite; the patient, a strong healthy girl of 13, exhibited a number of serious symptoms; xanthopsia lasted about three days with her. Cases of yellow vision have also occurred from nitro-glycerine poisoning, chronic alcoholism (in a man with ascites and cirrhosis of the liver), digitalis poisoning, over-use of tobacco,

and dosing with phenacetin. In this last case the patient, a healthy, well-nourished man of 45, who had taken about 2 grammes of phenacetin for the relief of severe headache, was seen by the author; the headache had diminished somewhat, but yellow vision lasted for two days; the acuteness of vision was not interfered with, and the fundus showed no change whatever. Iodoform has also been known to cause xanthopsia, even in small quantity.

One of the most recently recorded cases of yellow vision was due to siderosis bulbi. The patient had received a small splinter of iron in the vitreous chamber, but the eye became quite quiet, with full vision. However, xanthopsia came on later, especially when the patient looked at a white surface, and vision failed gradually and completely. It seems natural to conclude that the xanthopsia was caused by the staining of the media, but Bettremieux, who records the case, considered that it was due to a toxic influence,—on what grounds the author does not explain.

Lastly, Hilbert refers to the substance mescal, obtained from the young shoots of the cactus, as causing coloured vision, and regrets that the original description of the case is inaccessible to him. A reference to it (Havelock Ellis, in the "Nineteenth Century" of some ten years ago) would have shewn that the sensations produced by that drug are of the nature of hallucinations and hardly come into the category he is now considering.

It is thus seen that of all colour-alterations of vision produced by the action of toxic substances, yellow vision is the most widespread, and then follow blue or violet vision, and then red or orange. No substance has yet been observed to cause green vision, though green vision has been known to occur in optic atrophy.

W. G. S.

KOMOTO (Tokio). A Plan for the Improvement of Vision in Albinism. *Klinische Monatsblätter für Augenheilkunde*, May-June, 1907.

MUCH has been written regarding the albinotic eye, but very little has hitherto been done to endeavour to remedy the discomfort which distresses the patient, or to improve his vision. Komoto has not been able to find in the literature on the subject any suggestion such as he now puts forward, perhaps

because the plan—at least the first of his plans—is calculated to produce an even worse deformity than nature has done, perhaps because it had not occurred to anyone to suggest it.

One cause of the nystagmus no doubt is an effort on the part of nature to protect the feebly pigmented parts from overstimulation and from destruction by the excessive light; and one cause of the bad vision is the entrance of light, not merely through the pupil, but through all the exposed parts of the eye. Tattooing of the cornea is of little value, if any, and has been discarded.

The case which brought the question practically before Komoto was that of a lad of 16, regarding whom there is not much to be said further than that he was a typical albino, with much photophobia; there was a slight degree of nystagmus. He could count fingers at about five feet distance in ordinary daylight; in the evening vision improved (as is not unusual in these people), and he was able to count them at eight feet. Tattooing of the periphery of the cornea enabled him to count at a distance of one foot more. It then occurred to Komoto to inject Indian ink under the conjunctiva and so diminish the entrance of light through the sclera. This he did accordingly, at first above, where the tinting would be at least partly hidden by the upper eyelid; the procedure was repeated on two occasions, including the whole of the ocular conjunctiva in its scope; the blurring thereby was so much alleviated that vision rose to $20/200$. Komoto then turned his attention to the eyelids, and in order to render them less freely pervious to light and more efficient as screens he injected into both of them more of the suspended ink. The result of all this was that vision actually rose to $20/50$, an immense gain to the patient.

The disadvantage to be put against this is of course the dreadful unsightliness of an eye thus blackened, a disadvantage which would not be any less amid a white population than it was in an Asiatic. Komoto accordingly set about to try to discover some inert substance, whitish, opaque, and non-irritating, which might take the place of the granules of Indian ink. After making various experiments on rabbits, and finding that carbonate of lead answered the requirements, he decided to employ a suspension of it. He found that the little inflammation consequent on the injection in rabbits was neither severe nor lasting, and that the substance underwent slight chemical changes by which it soon acquired a somewhat

yellowish tint, thus causing it to present little contrast to the surrounding parts. Unfortunately, however, when the injection was made upon the actual patient the therapeutic result in the way of improvement in vision was practically *nil*, and he had to revert to the use of ink; this again answered very well, and the patient obtained a great rise in acuteness of vision.

Komoto suggests that perhaps a combined injection of lead and ink, or injections of one after the other, might secure the desired result with a minimum of deformity, and at any rate that by shortening the canthus by tarsorrhaphy, and so diminishing the area of conjunctiva displayed to view, one might reduce somewhat the unsightly appearance. He points out, further, that it would do little harm in this respect in many of the patients to make injections of ink into the eyelids deeply and near their margins; they would thus form a more effective light-screen, and the only result visible to the outside world would be a little blueing near their edges.

The suggestion is one eminently deserving of further trial. It is obvious, too, that the deformity could be still further minimised by the wearing of slightly tinted glasses which could correct the error of refraction which is so frequently present in albinos. Before proceeding to actual operation in any case it would be well to try whether, by means of a close opaque screen with just one small aperture one could improve the vision and diminish the photophobia. If so, one could then pass to the injection; if not, there would be no use in defacing the patient in this way.

W. G. S.

SCHLÜTER. **Cocain and Novocain.** *Klinische Monatsblätter für Augenheilkunde*, Aug.-Sept., 1907.

IN these days when new drugs are almost forced down our throats by the enterprising manufacturer, the bolus being wrapped for easier administration in a sheaf of "clinical reports," our thanks are due to Professor Sattler for instituting in his clinique a scientific comparison of the relative values of cocain and novocain as local anæsthetics.

The method of experiment was to place a drop of cocain solution in the conjunctival sac of one eye and a drop of novocain solution of the same concentration in the other eye of the same individual, and to test the sensibility of the corneæ

at half-minute intervals thereafter. The sensibility was determined by the method adopted by v. Frey in his physiological researches. A hair projecting about an inch from a small wooden handle was pressed on the cornea at right angles to its surface. This pressure cannot exceed, for each hair, a certain maximum, which is reached when the hair begins to bend; it can be measured in grammes by pressing the hair on the scale-pan of a balance. We have then only to determine, with the microscope, the sectional area of the hair and we know the pressure per unit area, which is assumed to be the measure of the sensory stimulus applied. A series of five such hairs, of ascending degrees of stiffness, was used in this investigation.

Taking the time line as the abscissa, and the degrees of anæsthesia, as determined by the hairs, as the ordinates, a series of curves was obtained showing the relative anæsthetic effects of the drugs as regards their intensity and their duration. The curves are given for solutions containing 0·5 per cent., 1 per cent., 2 per cent., 3 per cent., 5 per cent. and 10 per cent.

An examination of these curves shows that in the lower degrees of concentration the anæsthetic effect of novocain was less rapid, less intense and less prolonged than that of cocain. For example, the weakest solution of cocain which produced complete anæsthesia was 3 per cent., anæsthesia was attained within the first half minute, and lasted for two and a half minutes, while a 3 per cent. solution of novocain produced only relative anæsthesia, which reached its maximum in a minute and a half and then rapidly declined. A 10 per cent. solution of novocain was required to obtain complete anæsthesia of the cornea; with this strength anæsthesia was rapidly produced and continued for five minutes; a similar strength of cocain caused anæsthesia for eight minutes. The burning sensation produced by the more concentrated solutions of the two drugs was about the same with each. Novocain, even in 10 per cent. solution, affected the pupil but little and the accommodation not at all.

For infiltration anæsthesia clinical results showed again that novocain was a considerably weaker anæsthetic than cocain. A 0·75 per cent. solution of the latter, with 0·005 per cent. supra-renalin, gave effective anæsthesia, using 0·5 c.cm. for an advancement and 2 c.cm. for an enucleation; while 2 per cent. of novocain (with supra-renalin) had to be used for the same

purpose, or else the quantity of solution had to be doubled, which sometimes caused inconvenience from its bulk. The author states that novocain is five to six times less poisonous, weight for weight, than cocain, but this is apparently merely a repetition of the statement of Biberfeld and not a result of his own experience, for as a matter of fact no noticeable toxic symptoms were observed with either drug.

As regards price, the amount of cocain solution required for an enucleation costs about threepence less than the corresponding amount of 2 per cent. novocain.

In conclusion, the author does not go further than the moderate statement that novocain comes in question as a possible substitute for cocain in ophthalmic surgery.

W. G. L.

J. FEJER (Buda-Pest). **The Treatment in Embolism of the Central Retinal Artery.** *Centralblatt für praktische Augenheilkunde*, August, 1907.

ONE hears from time to time of cases of this lesion in which good results follow from massage or other treatment, but they must, one would think from one's own experience, be somewhat rare, for it is but seldom that one sees the case until the lapse of some little time,—very precious time—after the occurrence. The case recorded by Fejer is of much interest. It is that of a working man aged 52, whose fundus showed the characteristic appearances of embolism, with the cherry-red spot well marked, the retina œdematous, and the vessels very narrow. Iodide of potassium was given internally, the eye was massaged and bandaged; the massage being carefully applied with a direction generally circular. For three days the patient saw absolutely nothing, but gradually thereafter vision began to return; in three weeks he had $\frac{5}{20}$, and after eight weeks a doubtful $\frac{5}{5}$; while with +5 D, which was required to correct his H. and presbyopia he read the smallest type. At first as vision began to return the field was circularly constricted, but recovered lost ground, and at the end of the time of treatment was but slightly smaller than normal. In the fundus the cherry-red spot had of course disappeared, but the disc was pale in its outer half, and the vessels remained small in size. The urine, it should be added, contained no albumin, and though the heart sounds were dull there was no murmur.

It is just about a year since the same surgeon published a very similar case of recovery from embolism, but restitution of vision in it was less complete than in this. In it also there seemed to be no question as to the therapeutic value of the massage.

It was Mauthner who was the first to recommend massage in such cases, and he has been followed by other reliable observers. The purpose in view in employing it is of course to break down the embolism, and cause it to atrophy and move away. No doubt this is assisted also by the dilatation of the vessels. No doubt, too, the quickening of the circulation locally, the reduction of the intra-ocular tension, and the increase in lymph exchange all have their value. In some of the cases these effects have been enhanced by the performance of iridectomy or sclerotomy. The sooner the massage is begun the more likely is it to succeed, for this reason, besides others, that the clot is at first soft and yielding and may more easily shift its position, change its form and become broken up.

It remains only to be remarked that it is more than doubtful whether all or nearly all of the cases in which the ophthalmoscopic signs of embolism are present have in reality that origin, but if even in some of them massage is capable of bringing about a result so eminently satisfactory as that secured by Fejer, the fact ought to be known.

W. G. S.

CH. ABADIE. **Clinical and Therapeutical Considerations on Buphthalmos.** *La Clinique Ophtalmologique*, June, 1907.

So far treatment of this disease has been most unsatisfactory. The difference between glaucoma and buphthalmos, according to Abadie, is that in the former the rise of tension is due to an affection of the sympathetic and in the latter there co-exists, or rather pre-exists, a chorio-retinitis, which has hitherto remained unrecognised, partly because in many cases haze of the media prevents examination, and partly because in the milder cases it remains confined to the anterior portion of the globe where it is inaccessible to view. Under favourable circumstances in buphthalmos characteristic areas of atrophy and abnormal pigmentation of the choroid can be seen, but even if these signs are not discoverable the disease is probably

present, for the same method of treatment proves effective as in those cases in which the choroidal lesions are expressed. This treatment consists in the administration of mercury, preferably by intra-muscular injections. One case is mentioned in which several sclerotomies had been performed, with no result beyond the production of iridic herniæ, but injections reduced both the tension and the size of the globe permanently. The conclusion drawn is invariably to try mercurial treatment before resorting to operation and then to begin with paracentesis, and only if this fails to do iridectomy.

J. GRAY CLEGG.

M. DUFOUR. **On Temporary Hypertonus.** *La Clinique Ophthalmologique*, June, 1907.

DUFOR believes the symptoms of the so-called nocturnal dry conjunctivitis to be really the expression of a evanescent rise of tension. They are, heaviness of the lids on rising, feeling of resistance to ocular movements, absence of secretion, and disappearance of the trouble during the morning for the rest of the day. In more marked cases the vision is dimmed, but full acuity returns on active exercise. The increase of tension is said to be due to the dilatation of the pupil consequent on the darkness, to the lowering of the force of the general circulation, and in some cases to pressure on the great vessels of the neck from tight clothing. The frequent development of acute glaucoma during the night, and the access of symptoms in the second eye when the first has been operated on, are explained in the same way as the result of repose and dilatation of the pupil in the dark.

No direct evidence of the rise of tension is given; and we can but congratulate the author on the courage of his convictions when he maintains that the sensation of stiffness of the lids in conjunctivitis sicca is due to the pressure on them of the enlarged and hardened globe.

As treatment the following means are recommended:—Pilocarpine on retiring, light kept in the bedroom during sleep and active exercise very soon after rising.

J. GRAY CLEGG.

H. GRADLE (Chicago, U.S.A.). **Neuritis of the Intra-Cranial Portion of the Optic Nerve.** *Archives of Ophthalmology*, xxxvi., 2.

IN his papers on neuritis, Uhthoff has proved that the optic nerve between chiasma and disc may be inflamed without necessarily showing in the disc, and everyone knows that in certain of these cases scotomata of various forms and degrees are apt to be present; but Gradle believes that if the isolated area of inflammation of the nerve be confined to its intra-cranial portion there may be a different clinical picture. His present paper is written to supplement one which appeared some eight years ago or so, and which dealt with "one-sided amblyopia without ophthalmoscopic lesions;" in it he reported a few cases of transient amblyopia which seemed to him best explained by the assumption of an optic neuritis limited to the intra-cranial portion of the nerve. A new case which helps to confirm this view may be briefly described thus:—A man of 53, apparently in good health, had a sunstroke fifteen years ago, and two weeks before Gradle saw him had again been prostrated by heat, for a week after which occurrence he had had much headache. Ever since this prostration he had been unable to see with his left eye. Nothing abnormal could be found in either fundus, but while the right eye had $20/30$, the left had only "fingers at one foot." No scotoma could be found, but no colours were recognised by the left eye. Ten days later the vision of the left eye was somewhat better, and colours could be perceived by it. By the time two months had gone vision had risen to $20/50$, but the disc showed undoubted signs of atrophy. At the same time the veins of the retina were slightly engorged.

Gradle considers that in this case the absence of any normal portion of the peripheral field while the central region was all but completely lost is sufficient to negative the theory of a neuritis close to the disc, in view of Greef's demonstration that such always (?) exists.

We do not at present require to review the cases formerly published by the author; his contention is that "sudden diminution of sight, without central scotoma and with nearly normal field, but with decided impairment or abolition of colour perception throughout the field, tendency towards recovery, but possibly ending in incomplete atrophy, with

absence of all other symptoms except initial headache, is the clinical picture of intra-cranial optic neuritis. . . . The most probable cause of the lesion is syphilis."

To take the last point first: One of his three patients had a history of a doubtful sore; he had never any other symptoms of syphilis, and his wife had borne him a healthy family. Neither of the other two patients had the faintest suggestion of syphilis in his or her history, so on what grounds the statement quoted above is made one is unable to guess. Apparently Gradle's distinction between an ordinary retro-bulbar neuritis and an intra-cranial neuritis is based upon three slender supports, viz., the absence of a peripheral field, the occurrence of atrophy subsequently (which need not take place) and the absence of inflammatory changes in the disc as seen with the ophthalmoscope.

W. G. S.

J. OHM. **The Different Forms of absolute localisation in Concomitant Squint.** *v. Graefe's Archiv für Ophthalmologie*, July, 1907.

THE author describes three varieties of absolute localisation in patients with concomitant squint.

In the first group of cases the central impression is localised similarly with right or with left fixation, but eccentric impressions are falsely localised.

In the second group the eyes differ from one another in their relation to absolute localisation. The retinal image is always rightly localised by the one eye, always falsely localised by the other eye. Here the author points out that divergent strabismus in relation to absolute localisation is identical with paralysis of the internal rectus, and similarly convergent strabismus with paralysis of the external rectus.

Group three contains cases which have developed an anomalous retinal localisation in the course of the squint, so that binocular single vision is possible in spite of the squint. This group resembles the first in that the eyes used singly are approximately alike in relation to absolute localisation, but differs from it in that when the eyes are used together even the eccentric impressions of the squinting eye are at times correctly localised.

The author concludes that defective absolute localisation is not pathognomic only of muscle paralysis, but is also to be found in certain forms of concomitant squint.

Localisation with regard to breadth dimension is the resultant of the lateral innervation and the position of the image on the retina. Supposing the image to fall on the fovea, it will be localised as "straight in front" by one certain lateral innervation only in normal persons and in persons belonging to Group II., and by two different innervations in persons belonging to Groups I. and III.

H. HORSMAN MCNABB.

E. TROMBETTA (Turin). *Dictionary of Ophthalmology*. Turin: S. Lattes and Co., 1907.

WE have received a very neat and handy little Dictionary or Small Encyclopedia of Ophthalmology (*Formulario ragionato di oculistica*), produced by Prof. Trombetta, which contains in a convenient form a great deal of information regarding diseases of the eye and remedies employed. Subjects are arranged alphabetically, and on looking up Astigmatism, Dionine, Orbit (affections of), etc., one finds under each heading from half a page to a couple of pages of information on the topic. This information is well up to date, concise, sound, non-controversial, and reliable; in the 360 pages there are about the same number of entries. It does not profess to be anything more than it is, namely, a handy reference book which will remind one of what he has known and forgotten. Within these limits, and for readers of Italian, it may prove very useful.

W. G. S.

G. HARTRIDGE (London). *The Ophthalmoscope*. Fifth edition. London: J. and A. Churchill, 1907.

THAT there is an active demand for this little handbook on the ophthalmoscope is shown by the fact that now a fifth edition has been required. Mr. Hartridge's production well deserves the popularity it enjoys, and the author is to be congratulated on having brought out a work so handy, so instructive, and so satisfactory in all respects without being too "deep" for the majority of those who require to learn and to use the ophthalmoscope. There are but few changes from the previous edition. One could well wish that the black and white plates were improved upon; the coloured plates and the diagrams are greatly superior to them in merit.

DUDLEY BUXTON. **Anæsthetics: Their Uses and Administration.**
Fourth edition. London: H. K. Lewis, 1907.

THE new edition of this well-known handbook presents a succinct and up-to-date account of anæsthetics and their administration. The author briefly but sufficiently reviews the various general anæsthetics in their application to ophthalmic surgery; their advantages and risks are discussed, and the special danger of chloroform clearly pointed out. Some account is also given of the many preparations available for local anæsthesia in operations on the eye. The book forms one of Lewis's Practical Series, and may be taken as a sound and reliable guide on the subject of anæsthetics.

CLINICAL NOTES.

GLAUCOMA CAUSED BY INTRA-OCULAR TUMOUR.—Pusey (Chicago) describes a typical case of this condition in which the enucleated eye was subjected to careful examination; it illustrates one method (perhaps only one of several methods) by which the rise of tension may be produced, and in this respect is sufficiently rare. Pigment cells, evidently having their origin in the tumour, had found their way into the anterior chamber, and thence into the spaces of Fontana. There they had acted as occluding particles, interfering with the exit of fluid from the eye, thus causing glaucoma. The angle of the anterior chamber was open except in one small region, where it was invaded by the tumour. There was an invasion of the limbus region by pigmented tumour cells completely filling up the meshwork of the ligamentum pectinatum, involving the sinus venosus scleræ, and extending along the perivascular lymph spaces deeply into the scleral tissue. There was marked invasion further of the tissue at the junction of the iris and ciliary body, and pigmented cells lay within the lumen of the vessels of Schlemm's canal. Pusey states that in the literature of the subject he has only found records of two cases similar to his own.—*Archives of Ophthalmology*, xxxvi., 2.

VESICULAR AFFECTIONS OF THE CORNEA.*

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THE epithelium of the cornea is very soft and delicate; it is exposed to injury; it is liable to suffer from cooling, from evaporation and dryness, and its nutrition only reaches it by osmosis through Bowman's membrane from the body of the cornea, which is itself only fed by lymph streams flowing through narrow and devious passages. Further it is only loosely attached by being applied merely to the smooth surface of Bowman's membrane. Yet in spite of its delicacy, its precarious nutrition, its liability to injury and to drying from exposure, most people pass their lives even to extreme age with retention of clearness and health in the cornea; this is due in great measure to the sensitiveness of the epithelium. This sensitiveness is not complex like that of the skin surface generally, it is a pain reaction only. Contact by a foreign body, the harmful effects of drying and of excessive light give rise all of them to a sensation of pain only. The epithelium consists of 5 or 6 layers, the lowest being cylindrical, the next being polygonal for several layers, becoming more flattened towards the surface, finally the surface layers are quite flat. Each of these layers is easily separated from the layers beneath it so that it is possible to get detachment of a single, or of several layers, or of the whole epithelium bodily from Bowman's membrane, on which it simply lies.

It is this case of detachment which forms an important point in the development of vesicular affections. Probably

* Paper read at the Annual Meeting of the British Medical Association, Exeter, 1907.

in all the mammals the separation of the epithelium is easily brought about and as easily repaired; it should be remembered that in the reptiles which cast off their epidermis, the corneal epithelium is shed at the same time, and it has often seemed to me that the periodic separation of the epithelium of the cornea which is met with in recurrent bullous keratitis is a kind of tissue memory of the time when it was customary to shed the epithelium at periodic times. Whether this be so or not the epithelium is cast off very easily under very different circumstances. In various forms of acute conjunctivitis, in panophthalmitis, in kerato-malakia, in neuro-paralytic keratitis, one or more layers of the epithelium are frequently cast off, leaving the parts beneath exposed to injury or infection. Under the pressure of a bandage, especially in inflamed eyes, the surface of the cornea may appear uneven owing to displacement of the epithelium; a marked form which I have seen many times is that of one or more raised lines or ridges running directly across the cornea, giving an appearance as if a fine hair had been lying on the surface; the ridge subsides generally on removing the pressure.

Another example is shown in the effect of cocain; often an ophthalmoscopic examination is made impossible after the use of a watery solution of homatropine and cocain owing to the œdema of the surface of the cornea; and the prolonged use of cocain will cause the whole epithelium to be shed upon the slightest touch. The same result is seen after the application of absolute alcohol to the surface.

Case of exfoliation of the whole epithelium of the cornea spontaneously.

In 1904 a healthy man of colour, a stevedore, came under my care at St. Bartholomew's with a bullous condition of his conjunctiva; the

mucous surface of the lower lid was raised in four places into blebs, very suggestive of pemphigus; the condition had arisen spontaneously two days before. The conjunctiva was much congested but there was little discharge. No organisms were discovered. The bullæ were cast off and the conjunctiva recovered and showed nothing abnormal. Two years later, in March, 1906, he came again to the Hospital, the eye having been quiet in the interval. He had rather severe congestion of the whole eye, but no disturbance of the surface of the conjunctiva; the surface of the cornea was hazy and swollen, forming a large bulla at the centre with sharp edges. The next day the epithelium had been cast off, leaving a large epithelial ulcer covering the cornea except at its margin: there was a small hypopyon, indicating infection of the ulcer. With simple treatment, boric acid and atropine, the ulcer healed, and no scar was left.

Two cases of raising of the epithelium from the cornea in an acute catarrh.

In a labourer, aged 42, there was marked swelling and œdema of the epithelium of the upper half of the cornea, bounded by a horizontal line crossing the centre of the cornea; the lower part of the cornea was affected to a much smaller extent. The lids were healthy and free from granulations. The corneal epithelium was so far detachable that after a night's rest it was raised up into a fold in the centre of the cornea, probably from lid pressure. This patient recovered but had many subsequent relapses.

A similar case was that of a gentleman aged 32 who had had watering and gumming of the eye for three weeks. The upper and lower thirds of the surface of the cornea were grey, opaque and distinctly raised, the middle third being normal and apparently depressed. The two raised parts gradually approached one another until they met in the centre, when the whole surface was raised and boggy. He eventually made a good recovery without resulting opacity.

Case of œdema of the conjunctiva with a local detachment of the epithelium of the cornea.

This was seen in a female patient at Moorfields who had been operated on by Mr. Couper twenty years before for cataract, and had had no discomfort except a slight passing irritation 11 years after the operation. When seen, in May, 1906, there was no sign of congestion of the eye, and no irritation; the conjunctiva of the left eye was œdematous, the other eye being free from œdema. For about three-quarters of the circumference of the left cornea, just within its margin, the epithelium

was raised up into a large horse-shoe-shaped bulla, the epithelium being normally adherent at the centre of the cornea and also all round the periphery of the bleb; the bleb was quite clear and contained a clear watery fluid, which could be moved by pressure from one part of the bleb to another. The general sensation in the cornea was normal but the detached epithelium, its nerves being separated, was without sensation. There was no evidence of kidney affection. The epithelium became reattached but, unfortunately, there is no note as to the sensation in this part of the cornea after the reattachment.

I have notes of two cases in which œdema of the cornea came on after exposure to cold wind, in one case always after bicycle riding, and in the other in an engineer who was exposed to wind in his work.

Having shown the readiness with which the epithelium is detached, we have next to consider the influence of its protective mechanism, the nerve supply. This is protective in two ways: first, by the sensation of pain which interference with the cornea gives rise to, and next by the influence which the healthy nerve has on the nutrition of the cornea, the trophic influence.

If we test the corneal reflex to pain in apparently normal eyes we meet with wide differences between individuals. The method I use is to tear a piece of coarse blotting-paper to a point and to use this point for touching the cornea; the advantage of coarse blotting paper is that you have every degree of hardness of material from the fine edge of hairs up to the solid paper. In normal eyes the reaction is very delicate, the contact of one or two hairs even producing a movement or quiver in the lids, while in other apparently normal eyes it is possible to touch the cornea with the solid end of the paper without producing any movement in the lid.

Using this method, I have sometimes in the case of a corneal ulcer tested the touch reflex of the affected eye, and then as a control tested the touch reflex in the unaffected eye, and to my surprise have found dulness of

both. I have not infrequently seen both eyes affected and even lost from ulcers of the cornea where the touch reflex was defective in each eye, and I think it is certain that eyes with a deficient touch reflex in their cornea are more liable to ulcers than other eyes. It is only what one ought reasonably to expect, that a cornea with defective sensation is also an imperfectly protected cornea. In making this test it should be borne in mind that a scarred or an œdematous cornea will not respond as a healthy one will. In addition to this general defect of nerve action we meet with local variations of touch reflex so that one portion of the cornea is less acutely sensitive than parts immediately near it. Where the nerve supply or activity is deficient we most often meet with the vesicular affections of the cornea.

Herpes Zoster of the 5th nerve is a disease whose pathology is to some extent known, and it will be well to examine it before dealing with the other nerve affections which we may, for convenience, group together under the term herpetic. In herpes ophthalmicus we have, as the cause of the whole eye trouble, an inflammation of the Gasserian ganglion leading to certain changes, one of which is anæsthesia of the cornea. Anæsthesia means loss of protection, liability to injury, and hence to ulceration. But in certain cases where the cornea has been protected we find other changes, such as deep keratitis, iritis, cyclitis and diminished tension. That is, in addition to the anæsthesia, there is an influence of an irritative kind passing down the nerve, leading to disturbances of nutrition at the periphery, or else there is a cessation of the normal processes passing along the nerve which are necessary for health.

If this is true of the main trunk of the ophthalmic

nerve it may possibly also be true of the small terminal branches, which may, by an inflammation of the nerve itself, set up irritative processes at the periphery. That there is some other influence than that of a simple detachment of the epithelium or of a simple infective ulcer present is shown by the peculiar behaviour of some of the ulcers of this group, in which I include febrile herpes of the cornea, dendritic ulcers in their various forms and filamentary keratitis. The vesicles follow certain lines or the ulcers branch in certain defined ways, the branching being preceded by elevation of the epithelium; or they are confined to one portion of the cornea. They do not heal readily like a simple abrasion, cauterisation repeated several times may be necessary, or it may even be necessary to destroy the epithelium over the whole area occupied by the ulcer. If they become infected they are very apt to produce iritis. It does not, therefore, seem far-fetched to suggest that there is a nerve basis underlying them, and that they are a form of neuropathic ulcer.

The occurrence of vesicular eruptions about the lips of children with febrile conditions is well known, and the same thing happens about the eyelids; small groups of vesicles appear along the distribution of the smaller branches of the 5th nerve; they occur during various fevers and in different kinds of deviation from health and are probably due to the action of toxins on the nerve; it is usual for many nerves also to be attacked, not belonging to one trunk, but small twigs belonging to several trunks, so that the affection is one essentially of small nerves rather than of large ones. Whether this points to a local infection of the nerve twigs through the tissues or not I do not know, but it is likely. The skin affection is always a herpes, that is an eruption of small clear vesicles in the

skin preceded by pain, and following the distribution of nerves. During these outbreaks one sometimes sees a similar condition on the cornea; and sometimes an identical condition appears on the cornea without the participation of the skin and is described as herpes of the cornea.

A striking example of this association between skin herpes and herpes of the cornea was seen in a case, recently under my care, of a herpetic eruption involving the upper lid on the right side, the outer side of the eyebrow, the side of the nose, the malar eminence and the tip of the ear, that is, twigs of the 1st, 2nd and 3rd divisions of the 5th nerve, also a small area on the tip of the left ear. There was also a small group of clear vesicles on the right cornea which, on magnification, showed the typical form of stellate ulcers. The patient had been subject to recurrences of the skin herpes about twice a year for the last 5 years.

The eruption was always preceded by pain of an intense kind in the ear, with accompanying deafness, both of which disappeared with the outcrop of vesicles.

The interest of the case lay in the association of a typical and extensive herpes of the skin with herpes of the cornea, some of the vesicles of which were simple blebs, while others had the branched or lobulated form peculiar to the stellate type of the dendritic ulcer. The age of the patient made it impossible to make any useful observations on sensation in the cornea.

Another case of interest was that of George C., aged 37, a meat porter, who gave a history of having had an ulcer in the left eye in 1893, and of another attack in the same eye in 1896. In October, 1898, while in Hospital for an attack of acute bronchitis, his left eye became inflamed again; he had several minute ulcers on the cornea which coalesced to form a typical dendritic ulcer, followed by iritis. In December, 1903, he had a slight recurrence of irritation in the scar of a dendritic ulcer which was clearly visible in the left eye.

On January 1st, 1906, he had a very severe febrile attack with a shivering fit; two days later he had great pain in the left eye and also a good deal of pain about the face; on the next day the eruption appeared. When seen on January 6th, there was a very fine vesicular eruption covering the side of the nose on the left side and extending over the bridge to the right side; there was a similar eruption on the upper lid of the left side. No anæsthesia of skin. The cornea was slightly rough

all over and steamy, and when magnified was seen to be raised into little vesicles, some of which had a definite stellate form. The sensation in both corneæ was dulled. The herpes disappeared and the cornea cleared and in about 3 weeks was fairly smooth again, but beneath all there was still the scar of the old dendritic ulcer to be seen. So that here was a man who had had one attack at least of dendritic keratitis with probable impaired innervation of his cornea having an acute attack of febrile herpes of the face with herpes of the cornea.

Febrile herpes of the cornea is characterised by its sudden onset, with pain and signs of irritation, and a feeling as of a foreign body inside the eye. If the lids be opened one part of the cornea will appear to have its surface rough, and this roughness will be found to be caused by a group of vesicles, sometimes forming a long sinuous line as if following the course of some nerve, or else forming a constellation of 8 or 10 dots. The vesicles are quite clear if not broken; if broken they show only an abraded surface with shreds of epithelium. They differ from phlyctenulæ in the suddenness of their onset and in the fact that they occur within the corneal margin and are not associated with a leash of vessels. In some cases there is local anæsthesia in the part of the cornea affected, in others not. Recurrences are fairly common, some of the cases occurring regularly; in one case relapses took place every few weeks during the whole period of pregnancy and lactation, and afterwards ceased entirely. They are most frequent in young people, and rather more often seen in females. The dead epithelium is cast off and cases make a good recovery, mostly without leaving any scarring. But of course wherever there is an abrasion of the cornea there is the possibility of infection and ulceration with development of iritis and hypopyon. In by far the greater number of cases the vesicles were situated in the lower part of the cornea as if connected

with a group of nerves which ran into the cornea at the lower part and divided for the supply of that half of the cornea.

As part of the subject I must speak here of *Filamentary Keratitis*, a very rare condition characterised by the formation of little filaments hanging from the surface of the cornea, several mm. in length, which when pulled off are found to consist of a twisted rope of epithelial cells; these are the remains of vesicles which by the action of the lids have become twisted into a rope, and like the rope made of separate strands are able to bear a strain which single cells would not bear, and are therefore able to drag off the surrounding epithelium.

Dendritic ulcers. These are seen under two forms. The one starts by a broad base at the limbus, sometimes extending one or two mm. into the conjunctiva, and runs a sinuous and always narrowing course across the cornea, throwing out little buds or branches at intervals on each side. The other form does not start at the limbus and is neither so deep nor so long as the first kind, but in other respects has the same characters; to this kind the name stellate ulcer has been given by Fuchs because of its tendency to start from a centre and radiate outwards like the points of a star. The stellate ulcer is often seen in the vesicular form, but the true dendritic ulcer less commonly. I have, in one or two cases, seen the dendritic ulcer entirely bullous, consisting of a raised track of epithelium not staining with fluorescein but afterwards becoming the typical shallow groove, and in several cases have seen small vesicles extending beyond the existing ulcer, only to be added to it a few hours later.

Anæsthesia is not complete in dendritic ulcers but in many, if not most, of the cases there is a relative loss of

sensation in the affected area of the cornea combined with intolerance of light.

The dendritic ulcer is more common in males than in females among my cases; recurrences are fairly common, and it is more likely to occur after middle life. The subjects of it are not in the best health: thus, in one case there were bleeding piles, three cases occurred after pneumonia, one after sciatica, three after so-called influenza, several more in old feeble people. I have seen it three times in very young children, one of these was suffering from pneumonia, one from suppurating hip disease, and one case was in an apparently healthy and vigorous baby and this was one of the most extensive I have ever met with.

Iritis is a not uncommon complication, and I have seen cases diagnosed and treated as iritis where the ulcer was nearly clear; the iritis is probably evidence of infection and is not an essential feature.

Treatment. A few cases get well spontaneously under rest and atropine, but this is uncommon; acute cases, if not dealt with rapidly, invade the whole cornea. I have, in two cases, seen ulcers start from the limbus on each side and meet in the middle; in one of these the whole epithelium was destroyed within a few days. Such cases offer considerable difficulty in diagnosis if seen far advanced when the characteristic features are absent. Caustic treatment of some kind is necessary; I have used nitrate of silver (4 per cent.), perchloride of mercury (2 per cent.), and the actual cautery, but the best and most humane treatment is by pure carbolic acid, which is partly anæsthetic in its action. Some ulcers require several burnings, and in some cases carbolic acid is not enough. Absolute alcohol may then be applied and I have never

known it fail when thoroughly applied but it produces almost unbearable pain afterwards. In an obstinate case it is necessary to rub the surface with a small roll of fine lint soaked in absolute alcohol; the epithelium shrivels up and comes off almost entire. I have never seen this violent proceeding followed by harmful results.

Herpes ophthalmicus. It is necessary to speak of this affection because in a certain proportion of the cases corneal vesicles appear.

Of the cases I have collected in about 30 per cent. there was no corneal lesion; vesicles and ulcers were present in about 25 per cent.; conjunctival hyperæmia in about 14 per cent., and interstitial keratitis in about 25 per cent. Anæsthesia was present in about 75 per cent.; in 25 per cent. there was no anæsthesia, and in one of these non-anæsthetic cases there were corneal vesicles. The duration of the anæsthesia was from 6 weeks to 2 years or more. Diminished tension was sometimes present; in one case the pupil was dilated without other evidence of sympathetic nerve stimulation.

With regard to the frequent statement that where the tip of the nose is affected the cornea is also affected, owing to the cornea receiving its nerve supply from the nasal branch of the 5th nerve, I found that in four cases in which the tip of the nose was involved, the cornea was involved in three and not involved in one; in three cases of corneal affection the nose was not affected, so that this relationship is not a very close one.

It is necessary to distinguish between surface affections and deeper ones in herpes ophthalmicus; both may be due to trophic disturbance, but the surface affection is in a large proportion of cases due to injury, as is shown by the fact that care in protecting the cornea prevents the onset

of corneal affections or mitigates the damage to the cornea. When the disease begins as an iritis or deep keratitis, or a cyclitis with diminished tension or with deposits on the back of the cornea, the cause is one of trophic disturbance purely.

Relapsing bullous keratitis. I next come to what is perhaps the most interesting of all the vesicular affections. It is a well known disease and generally has this history and course.

A slight injury, involving an abrasion of a small portion of the corneal epithelium, heals after a few days under the usual treatment of rest, atropine and a bandage. After an interval varying from a few weeks to many months or even to several years (in one case 6 years) without any fresh injury, there is an exact reproduction of the original injury, a raising of the epithelium into a bleb, rupture of the bleb, casting off of the epithelium and healing; this process is attended by discomfort, loss of rest and general disturbance, and after several recurrences in some patients gives rise to a good deal of anxiety and apprehension of damage to the eye, while others get accustomed to the periodic discomfort and pay little heed to it. As a rule the epithelium heals without leaving any mark but generally after several relapses an opacity can be made out by careful examination.

Sometimes the disease occurs without any preceding injury, and relapsing bullous keratitis is especially liable to form on the surface of old leukomata, especially where the iris is caught in to the scar. In four cases there was no injury at all, in one case after a series of relapses in one eye going on for two years, the other eye became affected with bullæ and recurrences continued to take place

in one or other eye or in both together. This is of interest because it points to a primary condition of the epithelium as a cause of the disease.

In going through my records one remarkable thing is the very great preponderance of females affected; I find the proportions are 78 per cent. females to 22 per cent. males. This is partly explained by the fact that about half the injuries were caused by the scratch of a baby's finger nail. Other causes were: scratch by a kitten, injury by a quill, a piece of straw, a tintack, nearly always by something sharp.

The usual local change in the cornea during recurrence is a vesicle in the early stage, rarely seen; in one case a small crop of vesicles, in another case a raised sinuous line of epithelium rather like a dendritic ulcer; in another case a stellate vesicle with small epithelial elevations around it was observed. In none of the cases was anæsthesia present.

Frequently the health was apparently good, but generally there was some temporary deviation, removal of which caused cessation of the eye trouble. One case was alcoholic, another anæmic, several poorly nourished or underfed; one woman was overworked and overwhelmed by an increasing family; many had bad teeth; some cases were periodic and appeared to coincide with the monthly period, but investigation scarcely supported this view: the worst or most frequent relapses were associated in a marked degree with a poor condition of health and bodily vigour.

The treatment is not satisfactory because for the most part patients get accustomed to the attacks and do not seek advice, as the discomfort passes so quickly. I cannot say that I know the proper way to treat relapsing bullous keratitis, but I am sure that we should, in the first place,

secure the greatest possible excellence of general health, and remove any causes of anxiety or worry, and especially want of sleep.

In the treatment of the attack it is good to remove as far as possible any long tags of epithelium by tearing them away; this prevents dragging and displacement of the surrounding epithelium; atropine and a bandage should be used. With the object of preventing relapses I have used carbolic acid, perchloride of mercury 2 per cent., absolute alcohol, and the actual cautery without preventing recurrences. The only case which was better after treatment, and even this was not cured, was one in which I did an iridectomy, but this was a case of bulla forming on the site of an old leukoma adhærens, and I think that the benefit may have been due to the reduction of tension in the eye; but I also know of one other case in which benefit followed an iridectomy.

In treating a case now I should as far as possible find out the periodicity and try to anticipate an attack by full local application of dionine of sufficient strength to produce an œdema of the conjunctiva; having had some rapid cures of relapsing superficial punctate keratitis by this method I should give it a trial in these cases also. I should like to destroy the epithelium down to its base and start afresh; this could be done with either absolute alcohol or with pure carbolic acid applied with great thoroughness so as to remove the diseased epithelium over a wider area than that of the actual recurrence; but the prospect of cure by cauterization is not a very good one because the recurrent attacks are due to an unhealthy tendency of the corneal epithelium to shed itself, as is shown by the disease sometimes occurring without an injury at all, or in the uninjured eye, and by its frequently

occupying a somewhat different area of the cornea from that of the original injury.

Superficial punctate keratitis. It is considered by some that this disease should be included under the herpetic affections of the eye. It is rather a form of general catarrh of the conjunctiva, the grey epithelial elevations not appearing on the cornea alone, but being present over the whole extent of the conjunctiva in severe cases. Whether the organisms which have been described as occurring in the grey spots are the actual cause of the disease or not, in its clinical characters this disease resembles rather an infective process than a herpes.

Bullæ forming in deep corneal affections. These occur in the different forms of interstitial keratitis, in keratitis profunda, and in keratitis disciformis, and like the bullæ in glaucoma are to be regarded as an œdema of the epithelium; they do not come within the scope of this discussion.

THE ÆTIOLOGY OF OPHTHALMIA NEONATORUM.

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“NOTHING is wrong with me,” is a statement often made by the mothers of infants suffering from ophthalmia neonatorum, yet gonococci are frequently found in the eye discharge of such cases. During the past 5 years, as house surgeon at the Manchester Royal Eye Hospital, I have examined and conducted the treatment of over 500 cases of conjunctivitis in the newly-born, and, on receiving such an assurance from the mother, have repeatedly asked myself the question, Whence are these organisms derived?

On referring to the literature of the subject, I found that many observations had been made by ophthalmologists on the organisms producing the eye inflammation, and obstetricians had remarked on the frequency of leucorrhœa among the mothers of affected infants. I was unable to find any record of investigations in which the eye discharge had been examined, along with observations on the condition of the generative organs of the mother and the prophylaxis employed at the time of confinement.

I decided therefore to make a bacteriological examination of the eye discharge in ophthalmia neonatorum and at the same time to obtain, in as many cases as possible, the mother's history during pregnancy, the condition of the maternal passages after confinement, and any other factors which would throw light on the source of infection. I have investigated 100 cases.

There is much confusion respecting the nomenclature of this condition, many referring to it as "blennorrhœa"; I prefer "ophthalmia" neonatorum and would define the lesion as "a purulent or catarrhal inflammation of the conjunctiva affecting newly-born infants."

Historically, the ætiology of ophthalmia neonatorum is of considerable interest, for the disease has been clinically recognised from very early times. Soranus,¹ a contemporary of Galen, referred to the inflamed eyes of the newly-born child, and gave instructions for the care of the same immediately after birth. Aetius also, in his writings, remarked that the eyes of the newly-born infant should be washed immediately after birth. Quellmalz,² in 1750, called attention to the frequency and importance of this form of inflammation, and remarked on its connexion with the "fluor albus" of the mother. His view was that the

vaginal discharge acted on the infant's eyes through the blood. Ware,³ in his treatise published in 1780, thought "cold air" and "a scrofulous constitution" were the causative agents. Beer and Hill⁴ considered that bad and contaminated air, also exposure to strong light, produced the disease. In 1807, Gibson,⁵ of Manchester, made a very plain and concise statement as to the mode of origin of ophthalmia neonatorum. He quoted two cases of this disease and then remarked: "Since that time I have been so particular in my enquiries as the delicate nature of the case will allow, respecting the state of the mother's organs at the period of delivery, and have found, with little exception, that *fluor albus* existed." Simmons⁶ strongly opposed this view and believed that the inflammation was due to "a peculiar condition of the atmosphere." Middlemore⁷ thought that the disease was much more frequent at certain seasons of the year. He emphasized the importance of gonorrhœa as a causative agent. It was the discovery of the gonococcus by Neisser,⁸ in 1879, which led to a very careful enquiry into the ætiology of ophthalmia neonatorum, an enquiry which has resulted in the accumulation of many bacteriological facts, and to our present views as to its causation.

Ophthalmia neonatorum is an inflammation due to the inoculation of the infant's conjunctiva with infectious material. This inoculation may arise either

- (1) During birth. This is spoken of as primary infection, or
- (2) After birth, during the first hours or days of the infant's life. This is referred to as secondary infection.

Primary Infection.

This is the commoner variety, forming about 90 per cent. of all cases. The inflammation usually appears from the second to the fifth day. The source of the infectious material is, in cases of primary inoculation, to be sought in some abnormal secretion present in or about the vaginal canal of the mother. Piringer⁹ has shown that an abnormal vaginal discharge can produce a purulent conjunctivitis. He introduced leucorrhœal matter into the conjunctival sac. On the other hand Zweifel¹⁰ has pointed out that the normal lochial secretion has no effect on the infant's conjunctiva. Leucorrhœa is one of the most ordinary accompaniments of pregnancy, being present in from 25 per cent. (Van Scharch¹¹) to 100 per cent. (Haussmann¹²) of cases. Ophthalmia neonatorum is not produced by a virulent vaginal catarrh only; it is well recognised that a simple vaginal catarrh can produce a conjunctival inflammation. Cases are occasionally observed in which a well-marked gonorrhœal ophthalmia develops in the offspring of mothers in whom there is no recognisable vaginal discharge. In such cases we must keep in mind the latent form of gonorrhœa, first described by Noeggerath,¹³ as this may explain the source of infection. In other words, absence of discharge does not mean absence of gonorrhœa.

"It is a well-known physiological fact that the eyelids of the fœtus are not only closed but the edges incurved, till after birth, thus affording an apparent security against the introduction of infecting particles."¹⁴ Such being the case, it is obvious that, in the affected children, the eyelids were disturbed during birth: or the discharge, sticking to the lashes, is worked into the conjunctival sac when the eyes first open. During the passage of the head along the

vaginal canal the lids may be displaced by friction; we should expect therefore to find the disease more prevalent among the offspring of primiparæ, in male births, and in tedious labours; and this is borne out by observation. The application of forceps has been known to introduce infectious material (Lopez¹⁵). Again, digital examinations, especially in the case of a face or brow presentation, may lead to direct inoculation of the conjunctiva. Mules¹⁴ laid great stress on the mechanical action of the tightened perineal edge on the soft tissues of the infant's face; the eyelids become a little separated and, as a result, the abnormal secretion obtains an entrance. When the infant's head is born the lashes and lids are smeared with discharge which may gain admission to the conjunctival sac by the first natural movements of the lids or hands of the child, or the attendant may, from soiled hands or the use of infected sponges, introduce muco-pus during the first cleansing of the eyelids.

Sometimes the disease is present at or appears immediately after birth and must have been produced by an ante-partum infection. In over 50 per cent. of the cases of this nature the membranes had ruptured at least 24 hours before delivery, and it is probable that the virulent vaginal discharge obtained access to the eye through this breach. The examining finger may directly inoculate the eye in instances of early membrane rupture with a face presentation, a position frequently found in these ante-partum cases. Nieden¹⁶ noted ophthalmia in a baby born with a caul, and Armaignac¹⁷ saw a similar inflammation, with a purulent vulvitis, in a newly-born female child delivered three-quarters of an hour after the rupture of the membranes. In these cases it is probable that the organisms gained an entrance to the amniotic fluid through the

maternal blood-vessels or some very small rent in the membranes. In Armaignac's case the mother had gonorrhœal metritis.

Secondary Infection.

This is much less frequent than the primary infection. With a reasonable amount of care and cleanliness it need never occur. The disease usually appears after the fifth day. The resulting inflammation is seldom so virulent as in the primary infection.

The factors which tend to produce this variety of inflammation are briefly as follows:—

(1) The omission of all antiseptic precautions in the case of a mother suffering from an abnormal vaginal discharge.

(2) Infection from contaminated bath water.

(3) Carelessness and the use of dirty linen in the cleansing of the infant's eyes.

(4) Conveyance of infectious material by the mother's fingers, etc. In her efforts to keep the eyes clean, the mother may inoculate them with linen soiled by vaginal muco-pus, or by the use of a handkerchief moistened with infected sputum.

(5) From one child's eye to another's, through the nurse's carelessness.

(6) The disease may arise, as Haussmann has suggested, from a sore nipple, a suppurating inflammation of the navel or other part of the child. It may be secondary to some disease of the tear passages or to congenital suppuration of the facial bones.

(7) Local irritants, such as silver nitrate in too strong solution or carelessly applied, soap, etc., may set up a conjunctivitis.

By such means it is possible for infectious material to become engrafted upon the infant's conjunctiva. Probably the exposure of the newly-born child's eyes to light, and the altered temperature of the surroundings, may so diminish the resisting power of the conjunctiva as to make it more susceptible to an attack of inflammation, in the presence of an exciting agent. A too vigorous cleansing of the eyes immediately after birth may, by irritating the conjunctiva, produce an abnormal exudation which would be an excellent medium for the growth of any organism introduced by secondary infection.

The Infective Agent.

What is the nature of the virulent material producing the inflammation? "The normal conjunctiva in the newborn is free from bacteria,"¹⁸ hence any organisms present are foreign to it, and must have been introduced. The bacteriological examination of the eye discharge from affected infants has brought to light the presence of many pathogenic organisms, of which by far the most frequent is the gonococcus.

The following organisms have been demonstrated in the eye discharge: Gonococcus, Pneumococcus, Koch-Weeks Bacillus, Morax-Axenfeld Diplo-bacillus, Bacillus Coli Communis, Staphylococcus and Streptococcus Pyogenes, Bacillus of Influenza, and the Bacillus of Pneumonia. Besides these the Xerosis and certain other bacilli, and sarcinæ have, from time to time, been found, but could not be considered as exciting causes of the inflammation. In some cases of ophthalmia neonatorum no organism is found in the eye discharge.

The gonococcus is the cause of a large number of cases, varying from 35 per cent. (Grœnouw¹⁹) to 100 per cent.

(Andrews²⁰); the average, from the literature I have collected, is 64·5 per cent. The gonococcus usually sets up a purulent conjunctivitis, but occasionally its presence is noted in catarrhal forms of inflammation. This interchangeability in the character of the inflammation produced by the same form of organism has not yet received an explanation.

The pneumococcal inflammations (forming an average of 17 per cent.) are usually accompanied by coryza and lacrimal obstruction. Incidentally it might be noted that Gasparini²¹ and Guáita²² have shown experimentally that the pneumococcus can produce a purulent conjunctivitis.

The question as to whether staphylococci can produce a conjunctivitis is still debatable. "In man, all experiments for producing conjunctivitis by rubbing virulent staphylococcus pyogenes aureus cultures into the intact conjunctival sac have hitherto failed."²³ Nevertheless the organism has been noted in the eye discharge, and Grœnouw¹⁹ observed a case in which it was present in a pure culture, and was therefore, he considered, to be regarded as the exciting cause of the inflammation.

Purulent ophthalmia practically always arises as a primary infection; the gonococcus is the organism usually present in the discharge but occasionally this organism is absent and one of the other organisms, notably the pneumococcus, present.

The catarrhal inflammations are generally the result of a secondary infection and are produced, rarely by the gonococcus, usually by one of the other organisms.

(To be continued.)

EFFECT OF PRESSURE ON THE HEALING OF
THE CORNEAL INCISION AFTER CATARACT
EXTRACTION.By EDWARD JACKSON, M.D.,
Denver.

IN the normal eye the sclero-corneal coat is distended by the intraocular pressure of about 30 mm. of mercury. The coat thus distended is able to resist the extraocular pressure to which it is ordinarily subjected, and maintains its form, and the normal relations of its parts.

The corneal section for cataract extraction reduces the intraocular tension to zero. The mechanical conditions that enable the eyeball to maintain its shape against external pressure are, for the time, destroyed. They are re-established when the union of the lips of the wound has progressed so far that the intraocular fluids are retained, to the extent of restoring in large measure the intraocular tension.

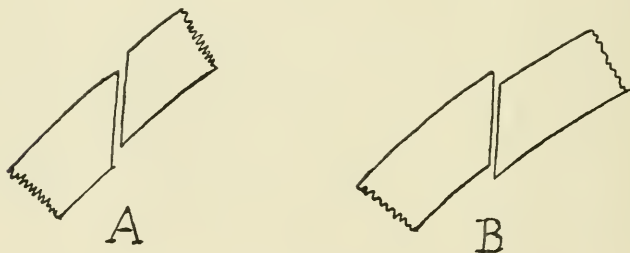
The relation which the two lips of the wound take to each other in healing, their relative position in union, is determined during this period when the eyeball is unable to resist extraocular pressure. Cicatricial processes subsequently may partly correct original misplacement of the lips of the wound; but the mal-positions are to some extent permanent when union has once taken place.

The tendency of external pressure, unresisted by pressure from within, is inevitably to diminish the volume of the eyeball. This diminution takes place by change of

shape, by distortion of the globe, and by over-lapping of the lips of the corneal incision.

An incision made in the plane of a great circle of the globe, perpendicular to the coats, which Graefe originally tried to attain, might show no tendency to the over-riding of one lip upon the other. But Graefe, in the final form of his operation, departed from the plane of the great circle; and all the incisions now generally approved for cataract extraction cut the sclero-corneal coat more or less obliquely.

In such an oblique incision, as represented in the figure, excess of internal pressure would tend to draw the lips apart to the position shown in *A*. But excess of external pressure tends to cause over-lapping, as in *B*.



As it has been pointed out the internal pressure after cataract extraction is zero; and the external pressure, unless it can be reduced to zero, becomes relatively excessive. Any squeezing of the lids, even their weight resting passively upon the eyeball, tends rather to diminish the volume of the eyeball, forces together the oblique lips of the wound, and produces the over-riding of the anterior or upper lip.

That such over-riding is very common after cataract extraction is quite certain. The late W. F. Norris called

attention to it in a paper read before the American Ophthalmological Society in 1887. He found it present in a series of cases which he reported, and noted the evidence of it in the illustrations of Becker's Atlas of the Topography of the Eye. It is well shown in Fig. 1, illustrating the interesting and instructive article by Dr. Henderson in the May Number of the *Ophthalmic Review*.

Attention was called to the importance of avoiding pressure on the globe after cataract extraction, in a paper read at the meeting of the American Medical Association in 1891. Dr. Henderson seems to have gotten a false impression of my views regarding this matter by studying, instead of the paper above referred to, one upon Astigmatism Following Cataract Extraction, which depends on a totally different physical condition. The relation of the lips of the incision in the scar is chiefly determined *before* they unite. The careful watching of any case of cataract extraction will show that the peculiar astigmatism following that operation only appears *after* the wound has united. Astigmatism may be caused by irregularities in the union of the lips of the wound. But the peculiar astigmatism in question develops and runs its most typical course after the most perfect and typical union. My idea of the connection of intraocular pressure with overlapping of the corneal flap resembles the school boy's notion of the connection between salt and bad bread. He wrote "salt is what spoils the bread when the cook leaves it out."

The explanation of displacement of the lips of the wound by preponderance of external pressure seems more closely in accord with the facts than that of a tendency for the cornea to alter its shape by inherent elasticity. I know of no behaviour of the cornea at the time of operation that seems to indicate a "freeing the corneal

lamellæ from their state of normal tension, and so allowing the corneal flap to spring forward." At the close of a smooth cataract extraction the cornea shows no change of shape indicating release from tension. This can be confirmed by any operator who will test the corneal reflex with a Placido's disk at the close of an extraction operation. If cocain has been used in excess the cornea even tends to collapse.

Overlapping is greatest, of course, at the centre of the wound where the movement of the corneal flap is less restricted by its relations to the adjoining tissue, than towards the ends of the incision. This does not depend on elasticity, but upon greater freedom of movement under any sort of influence.

The important, practical deduction from this theoretical consideration of the relation of the lips of the cataract incision is that *pressure upon the eyeball should be carefully avoided after cataract extraction*. Even harmful pressure cannot secure, or greatly assist, fixation of the eyeball. But very moderate pressure can be harmful, by causing such displacement of the flap as will interfere with smooth healing. Fixation of the eye and rest of the parts are favoured by closure of the fellow-eye, and guarding against startling the patient by sudden noises. A dressing in light contact with the lids keeps them closed, and favours quiet of the eye by reflex influence. But the bandage, which cannot retain its position unless it makes some pressure, should be discarded after cataract extraction.

REVIEWS.

BOLDT (Altona). Recent Experiences with Cyclodialysis. *Beiträge zur Augenheilkunde*, Heft 68.

WEEKERS (Freiburg). On Cyclodialysis in the Operative Treatment of Glaucoma. *Klinische Monatsblätter für Augenheilkunde*, August—September, 1907.

DURING the year 1906 Deutschmann performed the operation of cyclodialysis for the relief of glaucoma, according to Heine's method, 38 times on 37 eyes in 30 patients. In seven patients both eyes were operated upon, and on one eye the operation was twice performed.

Boldt has published a careful record of these cases, and has obtained the after-history of most of them for some months, but the longest record only extends to fourteen months after the operation.

The technique followed was essentially that advised by Heine. The conjunctiva is separated from the sclera about 5 mm. from the limbus, and a small incision, 2 mm. in length, made through the sclera down to the ciliary muscle, but without wounding this structure. A small stilette is passed in, held close against the *inner* surface of the sclera and pushed through the *ligamentum pectinatum* into the anterior chamber. By lateral movements the opening in the ligament is enlarged as desired, and the stilette slowly withdrawn, so that no escape of aqueous occurs.

No unusual difficulty was experienced in any case, slight hæmorrhage into the anterior chamber (usually undergoing absorption in a few days) occurred twelve times; iridodialysis occurred three times, and was followed by a very marked lowering of intra-ocular tension.

In one instance the stilette passed at first between the layers of the cornea, but no untoward results were noticed; in two other cases, as a consequence of rapid loss of aqueous, the instrument became entangled in the iris.

In ten buphthalmic globes considerable irritation was set up by the operation, and persisted for a week; but healing proceeded uninterruptedly.

Troublesome choroidal hæmorrhage was not noted in any case, and no visible detachment of retina occurred. It is not unlikely that very small peripheral detachments of choroid

and retina took place, but were beyond the limit of ophthalmoscopic observation.

The following varieties of increased tension were under treatment:—Prodromal stage of glaucoma, 2 cases; acute glaucoma, 2; subacute, 1; chronic, 12 (of which 5 were absolute); secondary glaucoma, 2; simple glaucoma, 6; hæmorrhagic, 1; absolute, 1; infantile (buphthalmos), 10.

Among the 37 operated eyes there were 9 only eyes; in 11 cases previous operations had been done unsuccessfully, viz., iridectomy in 10 and anterior sclerotomy in 1.

In consequence of the failure of cyclodialysis in 4 cases, other operative procedures were subsequently adopted: in three instances iridectomy, and in one case posterior sclerotomy.

It is unnecessary to republish the notes of the cases, as detailed by Boldt; those interested in this method of dealing with glaucoma will find a reference to the original article helpful.

A review of the cases shows that in 6 of the 37 the operation definitely failed to relieve tension; of these 6 cases, 2 were acute glaucoma, 1 subacute, 1 chronic, 2 simple. In the remaining 31 cases the operation was followed by a more or less lasting good result: a permanent reduction of tension being noted in 25 instances.

The author expresses the opinion that with more prolonged observation of the cases these results might be less favourable.

In the solitary example of hæmorrhagic glaucoma in the list a relatively good result was obtained. In this case anterior sclerotomy was performed two years previously without any effect. In thirteen to fourteen months after cyclodialysis no progress in the disease and no further contraction of the field of vision had occurred.

Of 10 buphthalmic globes operated upon, 9 gave satisfactory results; control of tension, clearing of cornea, and retention of the pre-existing vision. In one case a recurrence of tension was noted twelve months after the operation.

Comparatively few reports of experience with cyclodialysis have appeared since Heine's original paper at the Heidelberg meeting in 1905. References are given by Boldt to papers by Sattler, Logetschnikow, Czermak, and Krauss.

Only a small portion of Wecker's lengthy article is of practical value. It is that part containing the records of five cases of glaucoma operated upon by Prof. Axenfeld

according to Heine's method. The results in these five cases cannot be considered encouraging; the number is, however, too small to warrant any decided opinion as to the merits of the operation, especially in view of the nature of the disease in two of the five examples.

The first case was one of retinal thrombosis with high tension in an only eye. Anterior sclerotomy and iridectomy had failed. Cyclodialysis was performed; bleeding occurred through the wound, and a staphyloma formed. Tension was not relieved by the operation. Pathological examination revealed a detached and degenerated retina, with thrombosed vessels.

Case 2 was one of advanced chronic glaucoma; cyclodialysis was performed without difficulty, slight hæmorrhage occurring into the anterior chamber. The immediate result was good, and tension remained normal for at least five months; after an interval of ten months tension was again +3, and the eye was blind, but painless.

In Case 3, one of absolute glaucoma after cataract extraction, cyclodialysis was entirely without result.

In Case 4, one of glaucoma simplex, in an advanced stage, the operation was also without effect.

Case 5 was one of chronic glaucoma, in which anterior sclerotomy failed to relieve tension. Cyclodialysis was performed six days later, but was unsuccessful, and eleven days afterwards another sclerotomy was done. This was followed by a reduction of tension, which was not permanent.

J. B. L.

F. DIMMER (Graz). **Photography of the Fundus.** Wiesbaden :

J. F. Bergmann, 1907.

IN this monograph, which is an enlargement of the paper read at the International Ophthalmological Congress at Lucerne in 1904, and of the paper read at the Vienna Academy of Sciences in October, 1905, the author treats very exhaustively of the photography of the fundus. He begins with a full account of the literature on the subject, and taking it in chronological order, he gives in detail not only those methods of his predecessors which had been carried out into practical working, but also those which never reached beyond the stage of proposal or suggestion. The first of these predecessors was Noyes, who

in 1862 obtained imperfect photographs of the fundus of the rabbit. Bagneris (1889) was the first who limited the area of the illuminating light to half the pupil, thereby avoiding the otherwise very disturbing reflexes from the cornea. Two years later Gerloff was the first to succeed in obtaining a good photograph of the erect image of the fundus, of about $2\frac{1}{2}$ diameter widths of the optic disc. This he obtained by the aid of the water bath. In 1893 Guilloz photographed the inverted image. In 1896 Thorner published his experiments, and emphasised the fact that the most favourable conditions occur when one-half of the in-falling rays of light is used to light up the fundus and the other half for the production of the photographic image. The practical results he obtained were, however, very defective. In 1899 the author demonstrated some photographs taken by a method of his own, but they were far from being sharp and evenly illuminated, and he changed his apparatus, which developed into the present complicated form.

As regards the utility of photographs of the fundus, they must necessarily be of limited value, as long as they cannot be produced in natural colours. Until this goal has been reached—and just recently there seems to be more promise of an early solution of the problem—we must be satisfied with the black and white of the ordinary photograph. In order to be of use the photograph must, however, be sufficiently sharp and comprise a certain extension of the fundus, *i.e.*, of about 5 to 6 diameters of the disc, or more. If this can be done quickly, easily and well, and in such a manner that the eye to be photographed is not injured or unduly inconvenienced by the source of light employed for illuminating its fundus, the photograph will be valuable indeed as a record of the existing conditions, ready to be compared with any photograph taken of the same fundus on subsequent occasions, etc.

The difficulties which, however, have to be overcome are manifold. The most important of these are perhaps the reflexes of the in-falling light produced by the surfaces of the refracting media. Various ways of eliminating these reflexes have been proposed, such as the use of polarized light and of Nicol's prisms. The reflection from the sides of the prism and the loss of light inseparably connected with the use of a Nicol render their application useless. Nor is the employment of the water trough more successful; the inverted image cannot well be photographed in this way. Moreover, the

reflexes of the cornea only can thereby be eliminated, while those of the surfaces of the lens remain a disturbing element. The best way of eliminating the reflexes is what Thorner calls the geometric method. The rays reflected by the refracting media are sent in such a direction that they are not seen by the observing eye or by the camera which takes its place. This is done by a certain decentration of the lenses used.

Another difficulty is the source of light. For photographic purposes this source of light must combine a maximum of intensity with a minimum of extent. Such light allows of the very short exposure, which is necessary on account of the difficulty of keeping the eye absolutely still for any appreciable time. For that reason the electric arc light is far superior to any other illumination.

The focussing of the photograph is yet another difficulty; the eye must not be too long exposed to the bright glare without which no sufficiently lighted image could be produced on the focussing screen. Here also the electric arc light, suitably weakened, has proved the most serviceable source of illumination.

The requisite steadiness of the eye cannot be attained unless the head is held quite still; this is best effected by a mould into which the patient fixes his teeth.

The difficulty of obtaining sharpness of image over a sufficiently large field is increased by the great deficiency of the eye regarded as an optical system. The direct image does not give a good result, and the inverted image alone can be used. Even more difficult is the attainment of an equal illumination on all parts of the image. A great deal can be done in this respect by the selection of a suitable shape, size and position of the diaphragms, though even then some inequality will remain, which can be rectified only by modifying ("faking") the finished negative or the print. This is still a weak spot in the solution of the problem.

Another difficulty presents itself in the retinal reflexes. These cannot be eliminated by decentration of any lenses of the optical system, and as polarized light cannot be used for the reasons mentioned before, the only remaining course to follow would be to take various photographs at different angles,—unless indeed the finished negative or the print itself is to be "retouched" by hand, an undesirable procedure.

Lastly, any differences in the depth or level of the fundus

may also have to be rendered by taking several photographs focussed for different planes.

The description of the apparatus and its manipulation takes up a large portion of the monograph, and is illustrated by 28 diagrams without which any attempt at description would not be intelligible. The results obtained by the author are shown in a selection of 52 photographs, 48 in the original size and four enlarged. They are by far the best that have been obtained up to the present, and some, *e.g.*, the normal albinotic fundus and choroiditis disseminata, are of exquisite detail.

The author acknowledges the great amount of help he has received from various sides, both financially and otherwise, particularly from the scientific members of the firm of Zeiss in Jena, without which the work would have been impossible to him.

The apparatus was demonstrated in a practically finished form at the Congress at Lucerne in 1904, and at present exists in one specimen only, viz., at the Eye Clinic at Graz.

K. G.

C. H. MAY (New York). **Manual of Diseases of the Eye.**
Fifth Edition. New York: William Wood and Co., 1907.

WE welcome a new edition of this manual, which has won a place for itself by sheer merit. There are so many little books on the subject "for practitioners and students" that unless a writer can present the subject in a clear, convincing, attractive way he will not command the market. The fact that May's handbook—which is perhaps more familiar to us in this country as "May and Worth"—has reached a fifth edition is therefore a convincing proof of its excellence. It is indeed in some respects a model of what a manual should be. The letterpress is of the best, and the diagrams are on a par with it. For ourselves we do not like to see so much use made of italics by way of emphasis: it is needless and rather annoying to a reader,—but that is a small matter.

IRIDOCYCLITIS.*

By F. RICHARDSON CROSS, F.R.C.S. (Eng.).

ANATOMY AND PHYSIOLOGY.

The blood supply of the irido-ciliary region. A large part of the bulk of the ciliary body consists of the fibres of the ciliary muscle; this is attached anteriorly by its tendon to the sclerotic, close behind Schlemm's canal. The external face of the muscle is free and lies against the sclerotic, separated from it by the anterior part of the perichoroidal lymph space and lamina fusca. The fibres pass back to mix with the external layers of the choroidal tissue (tensor choroideæ). The circular fibres of Müller lie anteriorly and at the internal angle of the muscle close to the iris.

Inside the muscle and between it and the epithelial layers which constitute the pars ciliaris retinæ, is a fine network of blood-vessels supported by a fibrillar connective tissue.

The main blood supply is from the "circulus arteriosus major," which lies in the stroma of the ciliary body, close to where the base of the iris is continuous with it. The circle is chiefly formed by two long posterior ciliary arteries, which, running between the choroid and sclerotic bifurcate in the substance of the ciliary muscle to form the ring.

It is further supplied by the anterior ciliary vessels; these run forward outside the globe from the arteries that supply the recti muscles; after sending twigs to the conjunctiva and the limbus corneæ, they pierce the sclerotic at the insertion of the ciliary muscle to join the arterial plexus.

The circle of blood-vessels thus formed sends branches (a) *backward* in the ciliary muscle towards the choroid, and (b) *forward* to supply the iris and its vascular ring around the pupil—(circulus arteriosus minor).—but *the greater part of the blood* passes into the pars plicata and ciliary processes, forming in them a plexus of fine capillaries, so that each process is a blood reservoir somewhat like a glomerulus in the kidney. The "pars nonplicata," on the contrary, is somewhat sparsely supplied with blood-vessels.

While the choriocapillaris of the choroid is placed between two impermeable layers—the internal "Bruchs' layer" and the external limiting membrane—at the ciliary body these membranes disappear and allow

* Paper read at the annual meeting of the British Medical Association, Exeter, 1907.

the capillaries to come into direct contact with the epithelial cells, where they are called by Nicati the "glands of the ciliary processes," and no doubt the aqueous is secreted from the choriocapillaris of the ciliary body by the intervention of these cells.

Nearly all the blood from the uveal tract passes back through the *venæ vorticosæ*. The veins of the iris pass into the ciliary body to join those from the ciliary processes and the muscle.

The ciliary veins are very numerous, nearly all of them empty towards the *vasæ vorticosæ*, but a few twigs from the outer part of the ciliary region pierce the sclerotic as the small "anterior ciliary veins," while others join the canal of Schlemm. The canal of Schlemm lies in front of the tendon of the ciliary muscle in the adjoining sclera.

The blood-vessels and other parts of the ciliary body are supported by a fibrillar connective tissue which traverses the whole structure, but is best developed at the anterior surface or base. With the centre of this anterior surface of connective tissue, the iris is directly continuous, forming one structure with it, the one passing directly into the other. The histological formation of the iris, however, is widely different from that of the ciliary body.

The iris stroma is spongy and consists of fine fibrous tissue with branching cells containing pigment, which according to its distribution and amount gives the colour to the iris.

Secretory functions. The anterior surface of the iris contains a number of crypts which open into the anterior chamber, and are probably concerned with absorption rather than with secretion.

The connective tissue of the iris passes outwards towards the cornea, blends with the fibres from Descemet's membrane, and helps to form the "ligamentum pectinatum iridis" and the "spaces of Fontana."

Nicati thinks that the aqueous cannot pass through Descemet's membrane, but that it escapes through the stroma of the iris towards the ciliary veins and *venæ vorticosæ*.

The inner wall of the ciliary body is known as the "*pars ciliaris retinae*." At the *ora serrata* the external pigment layer of the retina (*uvea*) is carried on unaltered to cover the ciliary body and its processes, with their folds and *lacunæ*. But the rest of the retina is profoundly modified; the rods and cones and nerve elements somewhat suddenly disappear, while the connective tissue portion and limiting membranes become altered, and give place to a layer of cylindrical epithelium (perhaps mainly continuous with the ganglionic layer) which lines the interior of the *uvea* and passes everywhere with it. These two layers of cells, columnar and pigmented, constitute the *pars ciliaris retinae*.

When they approach the base of the iris, the *uvea* passes on as a

single row of flattened nucleated cells, but the layer of unpigmented epithelium becomes elongated and enlarged, and very deeply pigmented, so that at the back of the iris, the uvea proper has behind it a still thicker and more deeply pigmented layer of cells (*pars iridica retinæ*): the two blend to form the pigment of the pupil.

The surface provided for the secretion of the intraocular fluids is much increased by the arrangement of the ridges, folds, and undulations of the "*pars plicata*." Its area has been estimated at about 6 centimetres (nearly $2\frac{1}{2}$ inches) square.

Though in animals below the mammalia there may be other sources for the aqueous and intraocular nutrient fluids, anatomical, experimental, and clinical evidence all go to show that in man and mammals the intraocular fluid is secreted from the ciliary processes, and that the other vascular structures in the eye take very little if any part in its production. In man and quadrumana the "*pars non-plicata*" is relatively large.

When the pupil is excluded, the secretion from the processes collects in the posterior chamber, but normally the greater part of it passes into the anterior chamber, and hence by the canal of Schlemm into the venous system.

There is probably but little secretion from the anterior surface of the iris, its structure seems to resemble that of the filtration angle, and it is essentially concerned with absorption.

A subcutaneous injection of fluorescein made in rabbits, is followed by a colouration of the fluid in the anterior chamber (more rapidly if the aqueous is tapped and allowed to fill with fresh fluid). After enucleation of the affected eye, lines of colouration are found in the vitreous, passing out from the ciliary processes. The processes, the choriocapillaris, and the epithelial layer between the cells are also coloured.

The colouration in the aqueous chamber appears as a vertical line, due partly to the intraocular currents, and partly to the fact that the temperature of the corneal lamellæ is 4° below the temperature of the aqueous, and 10° below that of the iris.

Is the fluid from the ciliary processes merely a transudation (like lymph) due to simple *filtration* from the ciliary capillaries? or is it a *secretion* from the epithelial cells?

Leber thinks that the intraocular fluid is produced from the ciliary processes simply by filtration, and that the amount is determined by the difference in pressure between the blood in the capillaries, and the fluid in the eyeball.

Nicati believes that the aqueous is a secretion from the cells of the

glandular epithelium of the pars ciliaris retinae, which he names the gland of the aqueous humour.

The blood pressure, intraocular pressure, and secretion of aqueous, stand in a causal relationship to one another. Ligature of the carotids appears to arrest the secretion of the aqueous humour, and is followed by emptiness of the chamber. A rise of intraocular pressure causes an increase in the amount of fluid secreted. The rate of absorption (or filtration) is also hastened by increase in the intraocular pressure. An increase of proteids in the intraocular fluid, which is thus hindered in its filtration, lessens the rate of absorption.

Treacher Collins believes he has discovered special gland-like processes passing from the pigmented layer of the epithelium, and best marked in the "plicata" at its junction with the "non-plicata."

"There are, then, situated in that portion of the eye which experimental evidence points to as the part from which the aqueous humour and nutrient fluid of the vitreous are secreted, numerous little tubular downgrowths of cells opening towards the interior of the eye, and separated only from the close vascular plexus of the ciliary region by a basement membrane. Their number in any one section it is impossible to count. The number in the whole circumference of the globe must be something enormous."

When we consider the important functions of the ciliary body in the secretion of the aqueous and of the nutrient fluids for the vitreous and lens, we should expect a slight modification of the secretory process to occur from time to time. Evidence, however, in this direction is by no means common.

CLINICAL APPEARANCES.

Vitreous opacities. Sometimes we observe a fine haze in the anterior part of the vitreous just behind the lens, or dots or fine threads may be seen floating in it; such a condition is probably due to exudation from the ciliary vessels or Collins's glands. Any mild catarrh or hyperæmia of the ciliary body is likely to be accompanied by slight superficial synchysis, but unless the fibres of the vitreous body are structurally injured, such haze behind the lens is temporary or so slight as to be unobserved.

Choroiditis is undoubtedly often associated with vitreous opacities, and should always be suspected when the synchysis is thick and dense. But on the other hand very definite and widespread choroiditis may be present without any well-marked opacities, which when present are probably to a large extent dependent on implication of the ciliary body.

Serous cyclitis may consist merely of excessive secretion from the ciliary vessels, but when more definite it consists essentially of a catarrhal inflammation of the ciliary body and glands. There is congestion of the ciliary blood-vessels with circumcorneal hyperæmia, and increase in the aqueous fluid, which becomes fibrinous, and may contain a few leucocytes with pigment epithelium. The more solid particles wash into the meshes of the filtration angle, and others are easily seen as punctate spots on the back of the cornea.

When the secretion is *albuminous* it does not readily exude, and it may distend the aqueous and produce a form of glaucoma (aquocapsulitis) which needs paracentesis of the chamber. The iris becomes discoloured, but few if any synechiæ are formed.

Such cases subside without any deterioration of the sight, but like other catarrhs they have a tendency to relapses and recurrences to a more or less definite extent. We see *serous*, *catarrhal*, *hæmorrhagic* or *plastic* exudations, according to the control of the ciliary blood-vessels, or the condition of the blood.

There is a form of slight iridocyclitis which has a great tendency to recur; but if well treated, years may pass without any permanent synechia being formed or damage done to the eye or sight after repeated attacks.

In such a case return of "cold in the eye" should be

looked upon as an attack of "recurrent iritis," and mydriatics should be used to prevent synechiæ which will otherwise form.

Another type of iridocyclitis in its progress closely resembles *interstitial keratitis*; a serious amount of mischief may be done to the eye, but it eventually results in a gradual and more or less complete recovery. The cases are essentially chronic and continuous, often binocular. The cornea is unaffected excepting for the presence of punctate spots on its posterior surface, though these may occasionally set up Descemetitis and proliferation of the cells lining the aqueous chamber. There may be no peg teeth or other evidence of inherited syphilis.

Plastic iridocyclitis. When the inflammation is of a more active type, the hyperæmia is more intense, the eyeball is congested, and the conjunctiva is swollen. The exudation is fibrinous, and associated with the presence of leucocytes; it lines the surface of the ciliary body, passing forward among its processes, and back along the pars non-plicata and retina; multinuclear cells are seen on the surface of the iris, and they pass into the vitreous and aqueous fluids. A hypopyon may be chiefly cellular and fluid, or fibrinous, according to the composition of the exudate. The leucocytes almost certainly come from the blood-vessels of the ciliary body, they have emigrated either through the epithelium of the pars ciliaris retinæ, or have escaped more readily by damage in this membrane.

The pigment cells may break up and pigment escape, while pigmented cylindrical tubes develop from the epithelium. The exudation spreads in all directions, the leucocytes proliferate and form new cell material; new blood-vessels are also formed. As the exudation continues to develop, it forms layers; towards the ciliary body, it

tends to be *fibrous*, towards the vitreous *cellular*, and *fibrinous* between the two.

Cell growth and proliferation are most active towards the vitreous. Leucocytes, lymphocytes, cells from the retinal epithelium, and large free masses of protoplasm are formed in the fibrinous exudate. The connective tissue of the ciliary body is cedematous, and densely crowded with multinuclear cells.

The future progress of this exudation depends on the progress of the original irritation which has been its cause. If the irritant is removed or if the inflammation ceases, the vessels will contract, and existing diapedesis will be checked. But the exudate already existing can only be gradually modified. If it is *small* in amount it may be slowly absorbed; if *large* the cellular portions towards the centre of the vitreous tend to degenerate and undergo fatty changes, which may be accompanied by softening of the vitreous humour.

Along the ciliary body, iris, and adjoining structures, fibroblasts develop from the fixed connective tissue cells and invade the exudate. The fibrous tissue increases, forming cicatricial bands or membranes which will affect the eyeball in various ways, according to their relationships.

The lens may be bound down from behind by lymph and cyclitic membranes, or in front by synechiæ. The ciliary body may be dragged away from the sclerotic, or the retina, towards the lens, which may be more or less lined by exudation; the posterior chamber may be completely obliterated.

Degeneration of the ciliary body and vitreous, with shrinking of the globe, may follow, but if there is no pain,

and there has been no external wound or lesion of the eyeball, it may usually be safely left alone.

The *tension in iridocyclitis* is variable. The ciliary body presides over the nutrition of the eyeball, and affections of it are usually associated with diminished tension. During inflammation, however, the tension may be raised, by the increased blood flow through the arteries, and the engorgement of the veins, by the increase in the secretion of intraocular fluid, and by the difficulty in its escape at the filtration angle by reason of its albuminous nature. When there is a free escape for the secreted fluid, or when the amount of secretion is diminished, the tension again becomes reduced.

The usual conditions that predispose to glaucoma act during an attack of iridocyclitis, and the most important are the conditions of the filtration angle, and the nature of the exudate.

Major Herbert has published an interesting paper on the "Tension of the Eye in Iridocyclitis." * In the early stages of the severe attacks, and in the mild attacks throughout, the tension was low; later on the tension became raised with the period of increased exudation, or in eyes predisposed to glaucoma; later still destruction of its tissue or atrophy of the ciliary body is followed by diminished tension.

Purulent iridocyclitis. After injuries to the eye, or in patients in a very low state of health, the inflammation may be acute and the exudation purulent. Micrococci, and polymorpho-nuclear leucocytes are in great excess, the epithelial layers are destroyed and the pigment cells proliferate. Hypopyon is usually present, and the prognosis is very serious, for panophthalmitis usually results.

* *Ophthalmological Society's Transactions*, vol. xix., p. 39.

We have a typical picture of iridocyclitis in "sympathetic ophthalmia." It is generally subacute in character, Lacrimation, impairment of accommodation, injection of the anterior ciliary arteries, haze in the aqueous, sluggish pupil, circumorbital pain, and tenderness of the ciliary region are its chief symptoms. The exudation passes into the vitreous humour, it discolours the front of the iris, causes swelling of the stroma, produces synechiæ at the pupil, or causes retraction of the root of the iris by gumming it to the ciliary processes. There is always "cornea punctata," sometimes hypopyon.

CAUSATION.

Iridocyclitis is usually the effect of a constitutional dyscrasia depending on organisms, an incident in a general infection rather than a disease.

A blood poisoning associated with

Syphilis. Inherited syphilis: Iridochoroiditis, iridocyclochoroiditis, hyalitis or complication with interstitial keratitis.

Acquired syphilis. Secondary (iritis), tertiary (cyclitis).

Tubercle is quoted in Germany as the commonest cause of iritis.

Rheumatism. In *rheumatic fever*, rare. Drs. Poynton and Pain injected the diplococci from a pericardial exudation in a case of rheumatic fever into the veins of rabbits; one of these got a iridocyclitis.

In gonorrhœal rheumatism: not uncommon.

In rheumatoid arthritis—an infective disease due to a micro-organism in the joints, and to the effects produced by the organisms or their toxins in other parts: scleritis and insidious iridocyclitis fairly frequent.

Attacks of mild iritis often occur in definite *rheumatoid*, *rheumatic* or *gouty* conditions.

Iridocyclitis may complicate the *retinitis of albuminuria* or *diabetes*, or it may occasionally anticipate retinitis in these diseases.

Iridocyclitis may complicate the *toxic poisoning* of gastro-intestinal or vaginal inflammations, or it may be caused by "pyorrhœa alveolaris," or sepsis in the nose or accessory cavities.

Mumps and *typhoid fever* have been complicated by iridocyclitis, and typhoid bacilli have been found in the aqueous humour. *Cerebro-spinal meningitis* may cause it.

Is sympathetic ophthalmitis due to the action of certain specific eye cyto-toxins? Santucci made an emulsion of all the tissues of a healthy eye (Golovini employed simply the iris and the ciliary body), and injected it under the skin of rabbits; corneo-iridocyclitis followed in some cases, intense iritis in another. Injections of the same material under the conjunctiva produced no results, but with emulsion from an eye affected with phthisis bulbi intraocular inflammation followed, but soon recovered.

Iritis may complicate septicæmia; cardiac and vascular disease may cause it; and a few cases have been reported of *Cornea punctata* with tachycardia. Anæmic women seem specially predisposed to recurrent painless iritis. It appears to me often associated with erythema nodosum.

Iridocyclitis thus appears to be essentially an endo-infection depending probably on microbes. But the effects of cold, slight injuries to the predisposed eye, ocular fatigue from overwork, or light may be the exciting causes.

Lastly, as a cause of iridocyclitis, must be mentioned *wounds*, which in the ciliary region or "danger zone" are

liable to be followed at a longer or shorter period by a sympathetic cyclitis of the fellow eye. The progress in the eyeball will depend partly on the mechanical injury inflicted, and partly upon the infection of the wound by septic organisms.

TREATMENT OF IRIDOCYCLITIS.

A *wounded eye* must be thoroughly disinfected by repeated antiseptic washings; foreign particles must be removed, with any crushed or infiltrated edges of tissue: application of the cautery may be sometimes advisable. Thorough asepsis is of the first importance. A stitch or two may be thought advisable, but no deleterious substance must be sewn in.

In all cases of iridocyclitis, there must be *rest* of the eye, and of the patient. Relief from pain must be obtained, if necessary, by the free administration of morphia.

Can any special protection be applied against the action of micro-organisms or of the toxins they produce? The nutrient humour has some inhibitory power which it derives from the blood serum—subconjunctival injection of 4 per cent. sterilized salt solution increases this anti-toxin effect and seems to aid the escape of the antibodies from the blood serum. Recently sterilized air has been injected under the conjunctiva, 1 to 2 cubic centimetres as a dose. The air is drawn into a sterilized syringe through antiseptic cotton or through the syringe needle at red heat. Sublimate and oxycyanide of mercury $1/2000$ have proved useful as antiseptic injections.

The local blood pressure will be relieved by use of leeches on the eyelids, and by the administration of a hydragogue purge. The application of heat (dry, by a

lamp, the Japanese warmer, or Maddox's coil; or damp, by fomentations of belladonna or conium, is always comforting.

The use of a mydriatic is essential; a quite moderate iritis may block the pupil and prevent the escape of fluid from the posterior to the anterior chamber. But besides dilating the pupil, atropine tends to constrict the blood-vessels and lessens the exudation from them. The increase of tension due to exudation may be at once relieved by it, or in its place hyoscine hydrobromide (scopolamine) may be used. Dionine is often of service in relieving pain and the vascular over-distension.

There is no sound reason for the use of myotics in iritis or iridocyclitis, even when the tension is high, for this is not due to narrowing of the filtration angle but to its engorgement from the imperfect diffusion of the albuminous exudate: one or two applications of eserine or pilocarpine may occasionally be of service, but if continued, they will only increase the vascularity and secretion and encourage the formation of synechiæ.

If the tension continues the aqueous chamber should be tapped by a wide sclerotomy; this will relieve the pressure, give escape to the albuminous exudation, will for some days give good drainage, and allow of the free use of atropine.

Paracentesis of the anterior chamber during health, encourages the flow of antibactericidal substances from the normal blood into the aqueous, but they soon disappear; during inflammation it is of service in this way, and also because it allows of the escape of the bacteria, and their toxins, and of unhealthy secretions, while at the same time it improves the local conditions of the blood, as well as the power of its circulation. It may be beneficial even when

tension is subnormal, and if there is much congestion and exudation it may be of service, and can be repeated without fear of danger.

Iridorrhesis—tearing of the synechiæ with a spud—may occasionally be associated with paracentesis.

Iridectomy frequently becomes necessary, but it should not be done during the acute attack if it can be avoided: most of the urgent conditions can be met by paracentesis, which may be repeated if required.

Occasionally occlusion of the pupil, or other complication, may render it necessary, but fresh exudation is liable to refill the coloboma, or the vitality of the eye may be more lowered by the operation, and this may tend to softening and shrinkage.

When the eye is quiet after an attack, iridectomy should be done, if the pupil is becoming tied by multiple synechiæ, and particularly if it has become *excluded* with or without the complication of iris bombée. Operation is necessary for high tension, but it may be equally beneficial when the tension is subnormal, particularly when there is haze or floating opacities in the vitreous humour, for these are caused by an unhealthy condition of the ciliary body, which the operation may improve.

Complete posterior synechiæ will make the operation difficult, but even so, the front of the iris can usually be removed, leaving the uvea in contact with the front of the lens, and the posterior chamber opened up.

Grandeclément draws special attention to an inflammation of the iris, which is confined to the pigment layers “iritis uvéenne”—for this he says iridectomy is the only remedy, but it is an unfailing one; others would say that it is the only remedy for ordinary recurrent iritis, even where no synechiæ are present.

I frankly admit the great value of iridectomy in lessening the attacks or even in arresting the disease in certain cases. But it is not our application of it somewhat empirical, based upon bare practice? I should be particularly glad if we could get some sound opinion on this question.

If a case of iridocyclitis is a local manifestation of the faulty blood condition in a general disease, treatment must be directed to this primary cause of the eye affection, and it is of the first importance that an accurate diagnosis in this direction should be made, so that a sound prognosis can be given and the appropriate remedies applied without delay, not only to the eye, but also for the faulty state of the general condition to which the ocular affection may be secondary.

The term "keratitis punctata" should be finally abandoned. The cornea is not inflamed in these cases. "Cornea punctata" may not be satisfactory, but at any rate both words are Latin.

MECHANISM OF ACCOMMODATION AND THE FUNCTION OF THE CILIARY PROCESSES.

By G. F. ALEXANDER, M.B., C.M. (Edin.), Major, R.A.M.C.
(retired).

THE elastic tension theory of Helmholtz is as follows:—

(a) The cortical part of the lens being compressible and its capsule elastic, in the absence of restraining force the latter causes the lens to assume a form tending to the spherical.

(b) The tension of the suspensory ligament being greater than that of the capsule prevents the above action of the latter.

(c) This tension is removed by the forward traction of the choroid by the ciliary muscle, relaxing the suspensory ligament, when the elastic capsule is free to increase the convexity of the lens surfaces.

This theory, so ingenious as to have been all but universally accepted, fails to satisfactorily explain the asthenopia in presbyopia, as, though in this condition the lens is denser and therefore less easily compressible by its capsule, it affords no evidence of any increased resistance to the action of the ciliary muscle to which alone we can satisfactorily attribute its fatigue. Could it be shown that the increasing hardness of the lens was productive of increasing resistance to the action of the ciliary muscle accommodative asthenopia would be readily accounted for.

I venture to suggest the following as a possible solution of the difficult question of the mechanism of accommodation and explanation of the function of the ciliary processes.

(a) If we fill a spherical elastic bag with water, surround it with a cord network, passing a number of the strands in a circle through a board around a circular aperture in it and pull on these strands we will observe that the bag is caused to bulge forward through the aperture, its convexity thereby increasing, the more so the smaller the aperture is made.

(b) The membrana hyaloidea, the zonule of Zinn, the suspensory ligament of the lens, and the anterior capsule of the lens constitute such a bag, filled with fluid at a considerable tension. The membrana hyaloidea is approximated to the inside of the resistant sclerotic as far forwards as the beginning of the ciliary processes, by the bulging of which it is carried inwards as the zonule of Zinn, the suspensory ligament and the anterior capsule

being thus free and projecting slightly forwards in front of the ring formed by the ciliary processes. The suspensory ligament and the anterior capsule are elastic, and against them the lens is held suspended within its capsule.

(c) The ciliary ring is comparable to the circular aperture in the above experiment, the choroid to the cord network, and the ciliary muscle to the traction strands.

(d) The radiating fibres of the ciliary muscle, by their traction on the choroid, cause a forward bulging of the suspensory ligament and anterior capsule, with increase in their convexity, which is added to by the narrowing of the ciliary ring, resulting from the sphincter-like action of the circular fibres of the ciliary muscle. Positive pressure is thus exercised on the equator of the lens by the increased convexity of the suspensory ligament and capsule and increased tension of the suspensory ligament, while at the same time the lens is slightly advanced. Its anterior surface is thus both advanced and rendered more convex, while the increased convexity of its posterior surface backwards annuls the effect of advancement. From the fact that the circular fibres of the ciliary muscle are strongly developed in hypermetropia while faintly so in myopia, it seems clear that their contraction is an important factor in increasing the convexity of the lens, acting as it does firstly in supplementing the action of the radiating fibres by narrowing the ciliary ring, and secondly, by exercising direct pressure on the zonule of Zinn, and through this increasing the tension of the suspensory ligament, and thereby bringing positive pressure to bear on the equator of the lens. The increasing hardness of the lens as age advances thus furnishes the increasing resistance to the action of the ciliary muscle which is productive of the symptoms of presbyopia. On relaxation of the ciliary

muscle the recoil of the stretched suspensory ligament and anterior capsule restores the lens to its original flatness.

(e) The circular fibres of the ciliary muscle thus acting as a sphincter and causing a puckering of the ciliary ring analogous to that of a purse when its strings are tightened, this puckering would be irregular, due to heaping up taking place in some parts of the ring more than in others, were this not prevented by the ciliary processes being in the form of symmetrical frills or teeth each of which fits into a depression in the fluted zonule of Zinn to the bottom of which its apex is attached, which arrangement causes an even distribution of the pressure resulting from the contraction of the ciliary sphincter over the surface of the zonule and therefore over the equator of the lens. The puckering referred to is well exemplified in the action of the sphincter pupillæ, as though the contracted pupil may appear circular, a magnifying glass will show it often highly irregular in its outline, and showing great differences in the size of the folds, which in the case of ciliary processes is prevented by their fixation at regular intervals round the zonule of Zinn.

THE ÆTIOLOGY OF OPHTHALMIA NEONATORUM.

By JOHN WHARTON, M.A., M.D. (Cantab.).

(Concluded.)

Personal Investigations.

The number of cases investigated was 100, and in each case I made a careful bacteriological examination of the eye discharge as follows:—

Any discharge on the lashes was gently removed by means of lint soaked in boric lotion, the lower lid was everted and the conjunctiva covering the fornix was

stroked with a loop of sterilised platinum wire. Care was taken to get far back in the fornix and to avoid any contact with the edge of the upper lid.

The loop of fluid, thus obtained, was stroked on tubes of serum and agar. In cases where the discharge was scanty, I pricked the conjunctiva covering the lower fornix with a sterilised needle, and the drop of blood so obtained was stroked first over the conjunctiva of the fornix and then over the tubes of serum and agar. All the tubes were incubated at a temperature of 38°C. Subcultures of the organisms found were made on serum agar and blood serum, and from them film preparations were made. On two occasions cover-glass films were made, in each case direct from the conjunctiva. All the films taken, either from the conjunctiva or from cultures, were stained with Methylene-blue and by Gram's stain. Occasionally I stained films with Methyl-violet. In the cases in which dacryocystitis was present, cover-glass and also culture preparations were made from the discharge.

My enquiries respecting the mother's condition were especially directed towards her health during the last pregnancy. In cases where she had been medically treated during the pregnancy I obtained, in as many cases as possible, the nature of the lesion. The prophylaxis employed at the time of confinement was given me, either by the family doctor or the midwife in charge of the case. It was a difficult matter, in many cases, to persuade the mother to submit herself for examination; especially was this the case among those women who were certain of good health previous to the confinement.

I did not attempt, among the women who were examined, to investigate the total bacteriology of the vaginal discharge. Two cover-glass preparations were made of the

discharge, one was stained with Methylene-blue and the other with Gram's stain. If a diplococcus, similar in shape to the gonococcus, was present in the first, and absent in the second preparation, the organism was considered to be the gonococcus. No cultures were made from the vaginal discharge.

Analysis of the 100 cases.

(1) *Sex.* The disease was present in 53 male and 47 female children.

(2) *General health of the infant.* In 91 cases the general condition was good. The remaining 9 children were weaklings, 2 being prematurely born and 2 suffering from congenital syphilis.

(3) *Position in family.* The disease was most often seen among the first and second born children, as shown in the following table:—

Position in Family -	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
No. of Infants affected	-	39	26	12	8	1	4	2	3	2	1	1

These figures obviously do not represent the true relative liability of earlier children; to do so they would require correction for the absolutely greater number of such children.

(4) *Prophylaxis employed at the time of confinement.* In no case was vaginal douching adopted, but the infant's eyes generally received some attention. The various methods employed, and the organism present in the subsequent eye discharge, were as follows:—

Prophylaxis.	Eye Discharge Contained					Neg- ative.
	Gono- cocci.	Pneu- mococci.	Staph. p. aureus.	Koch- Weeks, B		
Water - - -	36	3	3	—		4
Boric Lotion - - -	16	—	—	1		2
Silver Nitrate - - -	2	2	—	—		7
Perchloride of Mercury - - -	—	—	—	—		1
Nothing done to Eyes - - -	19	—	—	—		4

(5) *Day of onset of the inflammation.* Usually the inflammation became manifest on the second and third day, as will be seen from the following:—

	At											
Day of Onset -	birth	1st	2nd	3rd	4th	5th	6th	7th	8th	10th	12th	17th
No. of Cases -	6	2	27	29	13	8	3	4	3	3	1	1

It will be noted that in 6 cases the disease was present at birth, but in only one of these cases was any information to be obtained to explain the early onset; in this particular case the labour had extended over 36 hours and the membranes ruptured 24 hours before the birth of the child.

It is of interest to note that of the 85 children who developed the disease during the first 5 days of life, 66 of them (77·6 per cent.) were cases of gonorrhœal origin.

(6) *The eye or eyes affected.* Both eyes were inflamed in 62 per cent. of the cases.

(7) *Type of inflammation.*

Purulent conjunctivitis was present in 86 % of the cases.

Catarrhal " " " 14 % " " "

An analysis of the organisms giving rise to the two types of inflammation is as follows:—

Type of Inflammation.	Gonococci.	Pneu- mococci.	Organism. Staph. p. aureus.	Koch- Weeks	B.	Negative.
Purulent -	72	4	1	1		8
Catarrhal -	3	1	2	0		8

It will be seen, from the above table, that on 3 occasions the gonococcus was present in the eye discharge of catarrhal inflammations.

The inflammations, both purulent and catarrhal, produced by the pneumococcus, were of short duration, never extending over 8 days.

(8) *The organisms found in the eye discharge.* The bacteriological examination of the eye discharge gave the following results:—

The gonococcus was present in 75 % of the cases.

The pneumococcus was present in 5 % of the cases.

The staphylococcus pyogenes aureus was present in 3 % of the cases.

Koch-Weeks bacillus was present in 1 % of the cases.

A negative result was obtained in 16 per cent. of the cases.

Contrary to my expectations I found that the gonococcus grew well on serum and agar in first cultures, if the conjunctivitis was purulent in character. In catarrhal inflammations, and in secondary cultures, its growth was unsatisfactory. I think this must be due to the rich nutritive medium provided by the purulent discharge.

With one exception (gonococcus and xerosis bacillus) the organisms found in the eye discharge were in a pure state. This, I think, is due to my method of obtaining a loop of discharge without touching the lid margins.

(9) *Mother's health.* A. Before delivery. The following table shows collectively, the state of the mother's health previous to her last confinement, with the organism present in the infant's eye discharge.

No. of Women.	Health.	Eye Discharge of Infant contained.				
		Gono- cocci.	Pneu- mococci.	Staph. p. aureus.	Koch- Weeks	Neg- B. alive.
46	Leucorrhœa	- 41	2	—	1	2
4	Leucorrhœa with Bartholinitis	4	—	—	—	—
1	Metritis	- 1	—	—	—	—
11	Gonorrhœal vaginitis	11	—	—	—	—
37	Good health	- 18	3	3	—	13
1	No history	- —	—	—	—	1
Total 100		75	5	3	1	16

Sixty-two mothers suffered from leucorrhœa, Bartholinitis, metritis or gonorrhœal vaginitis, and 57 of their

children (91·9 %) had gonorrhœal conjunctivitis; 37 mothers had "good health" previous to their last confinement, yet 50 % of their children developed a gonorrhœal ophthalmia.

B. After confinement. Fifty-eight mothers were examined, with the following results:—

Infant. Organism producing the Ophthalmia.	Condition found.	No. of Cases.	Remarks.
Gonococcus	(a) Vaginitis	33	Gonococci found in the vaginal discharge of 21 cases
	(b) Vaginitis with warts on vulva and anus	2	Gonococci in vaginal discharge of both
	(c) Vaginitis with Bartholinitis	1	Gonococci in vaginal discharge
	(d) Vaginitis and distended R. appendage	1	Gonococci in vaginal discharge
	(e) Vaginitis with ovaritis	1	
	(f) Pelvic cellulitis	2	
	(g) Normal	4	
Pneumococcus	Normal	3	
Staph. p. aureus	Normal	1	
Negative	(a) Vaginitis	2	
	(b) Left appendage thickened and tender	1	
	(c) Normal	7	

Only 9 % of the mothers of infants suffering from gonorrhœal ophthalmia had normal generative organs, the others all suffered from some pelvic mischief; 56·8 % of the mothers had a vaginitis, the discharge of which contained gonococci. It was quite the exception to find uterine, tubal, or ovarian disease among the women examined. In the cases in which gonococci were found in the vaginal discharge it was noted that, though the discharge was usually scanty, the vaginal walls were of a peculiar "wash-leather" appearance.

Of the 18 mothers who gave a history of good health but whose offspring had gonorrhœal conjunctivitis, 8 were examined after confinement.

3 were quite normal.

1 appeared normal but a cover-glass preparation from the vaginal wall showed the presence of gonococci.

1 had pelvic cellulitis with warts on the vulva.

1 had a vaginal discharge (no examination for organisms).

2 had a vaginal discharge which contained gonococci.

One of the pneumococcal cases was especially interesting, for I was able to trace the source of infection. The mother, who was delivered in hospital and had no pelvic disease of an infectious nature, volunteered the statement that she had on one occasion cleansed her baby's eyes with her handkerchief moistened with sputum. In this sputum I found the pneumococcus in great quantity.

My conclusions respecting the ætiology of ophthalmia neonatorum are as follows:—

(a) The majority of the cases (in my series 75 %) result from an infection with the gonococcus, and the inflammation is usually severe. Other organisms, notably the pneumococcus, may cause a milder form of inflammation.

(b) The source of infection is usually an abnormal secretion present in the vaginal tract of the mother. Especially is this the case among infants with gonorrhœal ophthalmia, for leucorrhœa is frequently gonorrhœal in origin.

(c) The absence of a vaginal discharge, a leucorrhœa, does not necessarily indicate the absence of gonorrhœa. A gonorrhœal conjunctivitis may appear in the offspring of a mother who "thinks" she is quite healthy. The mother's history, certainly among the poorer classes, must not be relied upon, and a rigid prophylaxis should be observed in every confinement.

(d) Infection may arise as a result of an inoculation of the conjunctival sac with sputum, filth, etc.

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REVIEWS.

- P. STOEWER (Witten). *The Treatment of Septic Thrombosis of the Cavernous Sinus, of Orbital Origin*. *Klinische Monatsblätter für Augenheilkunde*, August-September, 1907.

WITHIN the last decade we have made some progress in our knowledge of the etiology of the inflammatory processes which affect the orbit, and that knowledge can now be turned to advantage in the prevention and radical treatment of inflammations of the orbit. But in that class of cases in which orbital inflammation leads to thrombosis of the cavernous sinus we must confess that treatment has not gained much from our increased accuracy of diagnosis.

Fortunately, as Stoewer says, these cases are now rare. He has, however, seen three fatal cases within recent years, and consideration of these has led him to ask whether no treatment could be adopted with better hope of success than that hitherto employed.

Particulars of the three cases are given:—

1. Male, aged 19. Furuncle of left ala of nose. Exophthalmos at first of left eye, later of right eye also. Orbital incisions gave only very little pus, containing pneumococci. Result fatal.

2. Male, aged 18. Abscess of right ala of nose. Exophthalmos on the right side. Orbital incisions revealed a very little pus containing pneumococci. Extension of exophthalmos to left side. Death.

3. Female, aged 6. A week after recovery from measles small abscesses of right eyelids. Exophthalmos developed on right side; orbital incisions revealed no pus. Coma; rigidity of the neck; death. *Post-mortem*, pus in cavernous circular, superior and inferior petrosal sinuses, and in both anterior fossæ; septic thrombosis of all the veins of the right orbit.

The only non-fatal case of septic thrombosis of the cavernous sinus in the literature is that of Stocker (*Archiv für Augenheilkunde*, 44, p. 105), and Stoewer rightly casts doubts on Stocker's assumption that his patient owed his recovery to free incisions into the orbit at the supposed site of the primary infection, seeing that this treatment was only carried out two days after the symptoms pointed to the presence of thrombosis of the cavernous sinus.

Prophylaxis of septic thrombosis of the cavernous sinus resolves itself into proper treatment of its primary causes, among which the author mentions empyema of the accessory sinuses of the nose, septic conditions of the face, especially furuncle of the lip and nose (Cases 1 and 2) and eyelids (Case 3), erysipelas of the face, septic parotitis and septic diseases of the teeth.

As regards the treatment of furuncles of the face, it is not unlikely that, as Lexer suggests, such manipulations as attempts to squeeze out the slough may lead to dissemination of the infective organisms by forcing them into the blood and lymph channels. At the same time, the large incisions advocated by the same author may do harm by opening up hitherto intact

blood and lymph vessels. Stoewer suggests that in these cases *small incisions with the employment of suction*, as advocated by Bier, would be safe treatment. If, however, thrombosis has actually occurred in the facial veins there is danger of extension to the orbital veins by way of the angular vein, the path being only seldom interrupted by a valve. In that case *ligature of the angular vein* might be of some service in preventing spread to the orbit.

As *curative treatment* where thrombosis of the cavernous sinus is actually present, Stoewer suggests *serum therapy*. He himself used it, though somewhat late, in his second case. We already possess sera for the infections which are responsible for most of these cases, viz., staphylococci, pneumococci and streptococci. While the diagnosis of septic thrombosis can usually be made with some certainty, it will sometimes amount to no more than a probability. So long as any doubt remains, the existence of a phlegmonous inflammation of the orbit is possible, and we are justified in employing *orbital incisions*.

Direct opening of the cavernous sinus is not advocated by surgeons, but in a case of Knapp's (*Archiv für Augenheilkunde*, 42, p. 132) access to the sinus was obtained by the Hartley-Krause method and a non-septic thrombus successfully removed. It is doubtful if this procedure would be feasible in cases of septic thrombosis, where the necessity for packing would increase the difficulty and danger of the operation, but our author seems to think that *opening of the large orbital veins* after exposing them by osteo-plastic resection of the outer wall of the orbit might be productive of good results.

A. J. BALLANTYNE.

K. E. WEISS, Jr. (Gmünd). **Extirpation of the Gasserian Ganglion and Neuro-paralytic Keratitis in Man.** *Klinische Monatsblätter für Augenheilkunde*, August-September, 1907.

IN this paper Weiss describes the case of a man aged 47, who had had extirpation of the left Gasserian ganglion performed upon him on account of facial neuralgia of six years' standing. Four years after the operation he was seen by Weiss. At that time he suffered from excessive sweating of the face, especially

on the right side, occasional pains in the left eye, and want of sensation in the left conjunctiva and left side of the mouth. The excessive sweating of the right side of the face was confirmed by examination. The distribution of the left fifth nerve was quite anæsthetic. There was slight drooping of the left upper lid and fine fibrillary tremor of the left orbicularis. The left cornea was absolutely insensitive but transparent, and showed no trace of old inflammation. Results of examination of the eyes otherwise normal. Thus, although in the course of his work the patients' eyes were continually exposed to the risks of dust and other foreign bodies, the anæsthetic cornea had remained free from inflammation four years after extirpation of the Gasserian ganglion.

The author discusses in some detail, with references to the literature, the various theories with regard to the causation of neuro-paralytic keratitis as found in cases of fifth nerve paralysis or extirpation of the ganglion. On the strength of reported cases in the human subject, and experiments on animals, he rejects the "trophic" theory of Magendie, as well as the newer "trophic" theory which attributes the lesion of the cornea to paralysis of sympathetic fibres which have joined the fifth nerve, and which undoubtedly are liable to be involved along with the latter, as is shown by his own case and those of others. He believes that drying of the cornea from insufficient covering, combined with the occurrence of small injuries which provide a point of attack for pathogenic organisms, are enough to account for all cases of keratitis resulting from extirpation of the Gasserian ganglion. That keratitis occurs so seldom in these cases is due to the fact that the activity of the reflexes in the healthy eye insures the continuance of winking movements and of secretion of tears in the affected eye.

He concludes that the danger of keratitis after removal of the ganglion is so slight that the operation is not contra-indicated on that ground. The danger to the eye seems to be greatest during the few days immediately following the operation, but the practice of surgeons as regards bandaging and the use of atropine differs.

True neuro-paralytic keratitis, as it occurs, for instance, in herpes zoster ophthalmicus, cannot be classed along with the cases under discussion, and is not dealt with in Weiss's paper.

A. J. BALLANTYNE.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Meeting, October 17th, 1907.

The President, Mr. MARCUS GUNN, in the Chair.

A case of Tuberculosis of the Palpebral Conjunctiva.—

Mr. A. W. Ormond.

A GIRL, aged 9, was first seen on account of a swelling of the left upper lid. Subsequent examination showed some puffiness of the left side of the face and neck, with a sinus in front of the ear on the same side, the result of an abscess, and some enlarged glands beneath the sternomastoid. There was some history of phthisis on the father's side.

The left eye showed slight ptosis, and fulness of the upper lid, while on the conjunctival surface was seen a yellowish red swelling, extending along the whole length of the lid from just behind the free margin into the retrotarsal fold; on the surface were numerous granulations and some caseous material, part of which had broken down, forming an ulcer. A small piece of tissue was removed for pathological examination, and on the result of this the patient was treated with tuberculin injections, guided by the record of the opsonic index taken from time to time. A portion of the material removed was inoculated into the peritoneal cavity of a guinea-pig, which caused death in 14 days, with caseous masses found post mortem in several situations.

The treatment proved entirely successful, the conjunctival condition completely cleared up, and the general health also improved.

Proptosis in a boy, aged 7. ? Tuberculous Periostitis.—

Mr. A. W. Ormond.

When first seen there was swelling of the eyelids on both sides, with some proptosis, more marked in the right eye than the left, and a distinct mass was felt in the right orbit at the upper and inner margin, with some signs of inflammatory reaction in the skin and conjunctiva over it. There was no optic neuritis, and the vision was $\frac{6}{9}$. The proptosis of the left eye was slight, but some swelling was felt at the upper and inner margin of this orbit also. The medical examination of the patient proved negative; Calmette's tuberculin test produced no reaction; a portion of the swelling removed from the left orbit gave, on pathological examination, a result in favour of tuberculosis, but another portion inoculated into a guinea-pig did not cause death but only loss of weight.

Tuberculin injections were administered, and all the local symptoms have materially improved during the last month, the ptosis and proptosis of the left side having entirely cleared up.

Tuberculous tumours of the orbit are very rare, and Mr. Ormond mentioned only two, one described by Dr. Hansell of Philadelphia and another by Dr. Newton Pitt.

Since reading this paper, the guinea-pig, which was the subject of experimental investigations, has died, 38 days after inoculation, and the post mortem examination revealed general tuberculosis.

A case of Tubercle of Choroid and ? Retina.—Mr. S. Stephenson.

Mrs. P., aged 35, came under observation on September 23rd, 1907, complaining of mistiness of the right eye, which had existed for 2 weeks, accompanied by slight inflammatory reaction. The family history showed that the father died of phthisis; and one sister, aged 28, was under Mr. Stephenson's care in 1898 for iridocyclitis of the left eye, with tubercle of the choroid situated at the inner side of the disc; under treatment for some years this became reduced to an atrophic pigmented area, characteristic of obsolescent tubercle.

R.V. with +4 sph. = $\frac{6}{36}$. T +1.5. The cornea showed an irregular surface, the pupil was sluggish to light, there was much keratitis punctata, and no details of the fundus could be observed. L.V. with +4.5 sph. = $\frac{6}{12}$. The patient was fairly healthy with the exception of a few enlarged glands in the neck.

On September 24th Calmette's reaction for tubercle was tried and proved positive.

On September 28th the vision in the right eye was $\frac{6}{24}$ with correction, the cornea was clearer, and the keratitis punctata disappearing. Ophthalmoscopic examination showed at $\frac{2}{3}$ disc's diameter above and somewhat to the outer side of papilla a soft edged, ill-defined, greyish-white area, lying beneath the superior temporal vein, and consisting of two masses which became confluent, occupying a space about the size of the optic disc. On the nasal side of the patch was a triangular collection of pigment. Tubercle bacilli were found in the aqueous fluid. On October 2nd two minute tubercles were seen along a small retinal artery situated above the disc, and another some little distance on the temporal side near a branch of the superior temporal vein.

At the present time the vision in the right eye is, with correction, $\frac{6}{18}$, and the fields are deficient, as shown in the chart; very little keratitis punctata is left, but the optic disc is pale.

The diagnosis was based on the ophthalmoscopic appearance, which was considered typical, the existence of glands in the neck, the sister's case, the presence of tubercle bacilli in the aqueous, and the positive Calmette's reaction. Inasmuch as the patient's health was good in every other respect, it affords another proof of the existence of obsoles-

cent cases as described six years ago in the "Reports of the Society for the Study of Diseases of Children," and in "Bulletin et Memoires de la Société Française d'Ophthalmologie" of 1896.

The points on which Mr. Stephenson would lay stress are that tubercle of the choroid may be found at any stage and in any kind of tubercle, and that it is not unfrequently seen in connexion with chronic medical and surgical tuberculosis.

In connexion with this case Dr. George Carpenter said the patient showed no sign of tubercle in the body; and he also mentioned cases to show that when tubercles of the choroid were observed it did not necessarily mean that the prognosis was bound to be unfavourable, as some of the cases were those of obsolescent tubercle.

Sarcoma developing under a plate of Calcareous Material in an old Blind Eye, with early Perforation of the Sclerotic.—Mr. E. E. Henderson.

M.N., aged 64, came under observation in September 1907, with ecchymosis of right eye. There was a history of a blow 20 years before, which resulted in deterioration of vision, though the eye did not become completely blind until 8 years later. When seen there was a large subconjunctival ecchymosis, the cornea was clear and no scar was visible; the iris was tremulous and adherent to a shrunken cataractous lens. On the upper and inner side of the globe a distinct nodule was to be seen.

The eye was excised, and as much of the growth was extraocular the orbit was exenterated.

The eye was examined pathologically, when there was found to be calcareous degeneration of the choroid; and extending from the optic nerve nearly to the equator was a new growth, which proved to be a spindle-celled melanotic sarcoma, covered by a calcified plate. The sclerotic was perforated behind the equator and the extraocular part of the globe was increased in size.

Recurrence of Sarcoma at the Limbus.—Mr. W. H. H. Jessop.

This was the case of a female, who was shown before the Society on November 19th, 1903, and the former notes of the case will be found in the *Transactions of the Ophthalmological Society*, vol. xxiv., p. 16. At that time the growth was removed and the remaining tissue freely cauterized, and the sclerotic and cornea were found to be involved.

On April 24th, 1904, there was no sign of the tumour, and all the enlarged vessels had disappeared. It was not until May 30th, 1906, when the patient again came under observation, that the blood-vessels at the site of the growth were again found enlarged, and one large looped vessel was especially conspicuous below; the cornea in the

position of the old scar showed a black spot of pigment, and there was one in the sclerotic near the looped vessel; also 3 or 4 pigment spots in the conjunctiva. There was no pain, only some discomfort felt. Vision was $\frac{6}{18}$. On July 11th the condition was much improved, the pigment spots had disappeared, and there was less congestion. On March 20th, 1907, there was no sign of growth or granulation tissue, but the enlarged vessels were still present.

On October 15th, 1907, the history showed that there had been much more congestion of late, but no pain. The vision was $\frac{6}{18}$, the pupils were regular and natural; in the region of the old wound was a slightly raised, gelatinous, vascular growth, a little pigmented, measuring 2 mm. vertically and the same horizontally. The large looped vessel below still remains, and others have appeared; the cornea looks slightly infiltrated, and there is rusty brown pigment in the sclerotic above.

In the discussion which followed excision of the eye was strongly advised.

Cholesterin Crystals in a Cataractous Lens.—Mr. M. L. Hepburn.

Mrs. S., aged 74, is at present under the care of Mr. Lister, at the London Hospital, to whom I am indebted for leave to show this case.

She complains of "mistiness in front of both eyes," which commenced two years ago.

R.V. $\frac{3}{60}$, no H.M., L.V. $\frac{6}{60}$, c + 2 = $\frac{6}{36}$.

The only abnormality seen is that both lenses are cataractous though not yet mature, and amongst the lenticular opacities appear many glittering bodies which are cholesterin crystals.

PAPER.

A Case of Primary Extradural Tumour of the Optic Nerve.—

Mr. J. B. Lawford.

E.D., a female, aged 38, first came for advice on June 20th, 1906. The left eyelids were seen to be slightly puffy and slightly red; there was slight proptosis directly forwards, and movements upwards and outwards were restricted. No œdema was present, but the conjunctiva showed a little vascularity. No tenderness or pain. There was nothing to be felt in the orbit. Vision was reduced to perception of light. On ophthalmoscopic examination the media were clear, the papilla was swollen, illdefined, and pale; the retinal vessels were dilated but no hæmorrhage could be seen. The right eye was normal; nothing of note to be recorded in the family history and no specific taint.

Early in 1902 "something wrong" was first noticed with the left eye, and in April of that year she saw Mr. Wherry, of Cambridge, who found the vision in the right eye $\frac{6}{6}$ and in the left $\frac{6}{18}$, which could be improved to $\frac{6}{5}$ pt. with correction.

In 1903 and 1904 she was under the care of some other ophthalmic surgeon and was treated with drugs without any avail.

Mr. Lawford noted ?tumour of the optic nerve sheath or ?osteoma; and iodide of potassium was given for a time with no benefit. The patient was last seen on July 12th, 1907, when there was only very slight alteration in the condition. The œdema was still present and the proptosis had slightly increased; movements were now restricted in all directions; the pupils were inactive to light, and there was no vision. The optic papilla was much the same as before. No tenderness, no tumour, and no deep pulsation could be discovered, nor could the proptosis be reduced by backward pressure. There was much discomfort but no pain.

On July 18th, 1907, the eyeball was excised after a preliminary exploration, to see whether it was possible to remove the tumour without interfering with the globe itself. The tumour was found to extend from the back of the eyeball to the apex of the orbit; and after removal there was much hæmorrhage, and the lids remained swollen for several days after the operation.

Altogether there are 21 cases described of tumour of the optic nerve, and 3 similar to this one. Parsons, in describing his case in 1903 (*Trans. Ophth. Society*, vol. xxiii., p. 116) gave a complete list of the others, and out of the 18 cases given 12 were considered undoubted examples of this form of new growth; and three of the twelve were brought before this Society by Brailey, Arnold Lawson, and Parsons respectively. Since 1903 2 more cases have been recorded by Golowin in 1904.

Mr. Coats exhibited lantern slides of sections of the growth, which showed that it was an alveolar sarcoma, 25.5 mm. long and 18.75 mm. broad. The main mass of the tumour proved to be outside the dural sheath, though the latter was invaded to a certain extent. The inter-vaginal space was occupied in places by masses of growth, but it was not completely filled by it. Microscopical examination showed the alveolar arrangement of the sarcoma cells, coarse strands of fibrous tissue running through in various directions, and from these again passed finer bundles between the individual cells. The cells were small, oval, clear staining, and with well-marked chromatin dots; and there was no extensive area of necrosis anywhere. The optic nerve was not involved but was atrophic.

INTRODUCTORY ADDRESS.

The President then delivered his Introductory Address, in which, after reviewing the early history of the Society, he indicated some lines on which the activity of its members might be profitably employed, and made some suggestions for increasing the usefulness of the clinical cases shown.

MALCOLM L. HEPBURN

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